NOVEMBER 9, 1944

American Machinist

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Fixtures Speed Welding Of Magnesium Wing Tips

•

Effect of Coolant Temperatures On Cutting Tool Efficiency

•

High Speeds and Few Teeth Add to Thread Mill Accuracy

•

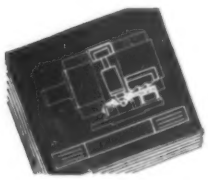
Dowel-Pin Holes Precision Bored

Reconversion Section

FINANCING INDUSTRY FROM WAR TO PEACE

The A B C's of Versatility

WITH HEALD BORE-MATICS

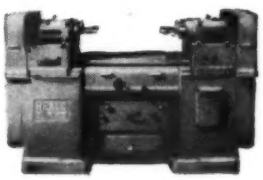


THE OPERATION — All types to suit your requirements

Bore-Matics are all-purpose tools, readily adaptable for boring, turning, facing, chamfering or grooving. Straight or taper surfaces can be machined, also curved and irregular shapes. These operations can be performed singly, simultaneously, progressively or in combination, in finishing, semi-finishing or roughing cuts.

THE MACHINE — Basically adaptable to all jobs

Basic design of Bore-Matics has unusual versatility permitting individual arrangement to suit every job—like slotted bridges holding one or more boring heads—flexible, adaptable drive to heads by V-belts—single-end or double-end bases—variable hydraulic feeds—hydraulic power for auxiliary attachments and clamping—and manual or automatic cycles.



THE TOOLING — Get maximum cutting efficiency

Possibilities of tooling arrangements on Bore-Matics are almost limitless. Single-point, broad-nose and form tools can be employed, either rotated by quills, fed radially by rotating tool slides, or given contour movement for irregular surfaces. Tools also can be mounted on the table, on cross-slides or angular slides, and on rotary tool blocks. Arrangements are also available for tool indexing and retraction.

THE FIXTURES — Get faster, better chucking

Widely diversified methods of work holding are available on Bore-Matics. Work can be chucked in rotating fixtures, between centers, or in stationary fixtures. Rotary-indexing fixtures, horizontal or vertical types, can also be furnished. When required, fixtures can be mounted on cross-slides for indexing or retraction from tools. Hydraulic, pneumatic or manual clamping is available.

HEALD Bore-Matics

THE MOST VERSATILE MACHINE TOOL

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November 9, 1944

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RETURN POSTAGE GUARANTEED

VOLUME 88 NUMBER 23

AMERICAN MACHINIST. Copyright 1944 by McGraw-Hill Publishing Co., Inc. Published every other Thursday, price 35c a copy. Allow ten days for change of address. Subscription rates—United States, Mexico and Central and South American countries, $5 a year, $8 for two years, $10 for three years. Canada, $6 a year, $10 for two years, $12 for three years. All other countries, $10 a year, $16 for two years, $20 for three years. Entered as second class matter, August 13, 1943, at Post Office, New York, N. Y., under the act of March 3 1879. Printed in U. S. A. Cable address. "McGraw-Hill, New York." Member of A.B.P. Member of A.B.C.

A McGRAW-HILL PUBLICATION

PRINTED IN U. S. A.

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From _____

_____

To _____

_____

Signed _____

American Machinist Chips

We Bow . . . Colonel D. Allen Lenk, Ordnance Department of Frankford Arsenal, compliments the editors of *American Machinist* for the presentation of the article "Flush Pin Gages Meet Stiff Ordnance Requirements." It appeared in the September 28 issue.

Requests . . . One of the privileges and responsibilities of *American Machinist* is to act as a source of information for readers who write in their problems. Most always we can answer inquiries or refer them to someone else.

Once in a while, however, there comes through a request so far out of our line that we have to throw up our hands. One such was a recent inquiry from abroad asking for a list of reputable American manufacturers who make a complete range of machines for the production of taps and twist drills.

This, you will agree, covers a lot of territory. Plant equipment necessary would require detailed study. Our answer to this good subscriber was to send a copy of our latest "Where-to-Buy" Directory and to refer him to the services of consultants who specialize in outfitting plants.

We want our readers to continue considering us a source of information on individual problems. But if it is a matter of equipping a whole plant, we'll have to bow out gracefully.

A Point . . . Comes along, in the next (or November 23) issue of *American Machinist*, another in our special series of "blue" sections. This one continues the line-up of articles featuring small tools. It will be on "single point tools," and we sincerely believe will merit your close scrutiny.

Electronic Heating . . . Dr. Wesley M. Roberds, development engineer of RCA Victor Division, stated recently that heat-treating of metal products by the use of electronic power concentration increases the efficiency up to 50%. Dr. Roberds pointed out that in usage of oxy-acetylene flame the transfer efficiency from source to work is extremely low so that heating equivalent to that produced by an electric power concentration in the work of 5 kilowatts per square inch is about the maximum attainable at present.

He further said that in electronic induction heating, it isn't difficult to put 100 kilowatts into a square inch of surface area with an over-all efficiency of 50%.

Dry Chips . . . Steaks being so scarce today, this item is about a Chip House . . . not a Chop House. It's housed at the plant of John Inglis Co., Ltd., and has paid for itself in the short space of two years.

Put this down in your little black book: Reclaims 20 to 30 tons of steel daily; recovers 10,000 gallons of cutting oil every month.

Not bad, not bad.

Bombing Details . . . Another letter from Bill Hargest, our Editor abroad, gives a few personal notes of his experiences dodging robot bombs in London. We quote:

"I lived for awhile in 'bomb alley,' and one morning after being bounced out of bed and seeing one of my handbags

go sailing through a window, I packed up and moved immediately to a quieter (?) section. Not long after that we had 19 of the 'bats from hell,' one of which caused debris to land on the house with an unholy clatter. Lost a couple of windows and a door that night. I was typing some letters to the office at the time, and when the real blast came I had jokingly mentioned the windows rattling—and they actually were doing just that. And then, Bang!

"In all seriousness, the bombings were devastating things. We thought they were over, but they have been occurring again and it is enough to make things very uncomfortable. I'll be glad, along with a million or so others, when we run Jerry out of Holland so that we can write finis to this part of the show." That's what we call getting up-to-the-minute editorial information for *American Machinist* the hard way.

Buzz from Boeing . . . From the Boeing Magazine we gather that: The B-29 is out to smash the Jap steel industry (mainly located in Manchukuo); the wing of the B-29 had to be—and we guess is—the greatest airfoil ever designed; a small, new type of self-sealing rivet has made the B-29's pressure cabin air-tight and may have some applications for your products.

Not just any kind of rivet, but a special one developed by Jerry Eckberg of Boeing. Saves production time and really does a job.

In the News . . . Most of you probably read last month about the blithe American bulldozer which pushed away the huge stone pinning down, for 200 years, the Witch of Scrapfaggot Green in England's Essex County.

We were entertained no end by the subsequent happenings around the countryside and prefer not to comment on the probable phenomena being caused by a spirit.

We're inclined to side with Arthur Sykes, Chief Warden of the village, who said, "I don't believe in witches . . . but then my grandfather didn't believe in radio."

Another "last line" gag in the news came from our old friend, Bing Crosby, who stated recently upon returning to the U. S. that he had seen many of his former jockeys in the battle area, but none of his horses. "It's just as well," said Bing. "We wanted to win the war, didn't we?"

Yanks . . . We liked the yarn the War Dept. got out recently about the sawmill an enterprising sergeant rehabilitated from the Japs. Wood being—in the Far East as here—a critical instrument of war, our guys over there have come to bat by cutting lumber for mess halls, houses, recreation centers, tent floors and supports, offices and, in short, everything that offers refuge from the mud and jungle.

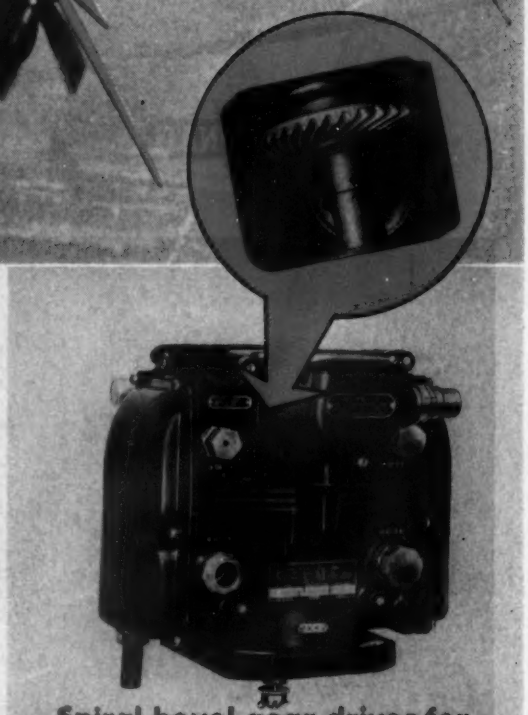
BEVEL GEAR DRIVES — TO *Victory*

International News Photo

40,000 SPARKS PER MINUTE!

Magnetos provide the spark of life upon which aviation engines depend. Spiral bevel gears drive the breaker cams which control the distribution of this spark with split-second timing to each one of the cylinders.

In order to supply this spark at the rate of 40,000 per minute, every minute in the air, these gears must operate with unfailing precision and smoothness at the high speeds required.



Spiral bevel gear drives for aircraft engine magnetos

Spiral bevel gears produced on Gleason machines are meeting the test daily . . . helping to keep cylinders firing and engines roaring uninterruptedly, both in routine flights and in the stress of dog-fights and bombing runs.

This ability of spiral bevel gears to operate smoothly and dependably at extremely high speeds will be available after the war to bring improved performance to the high-speed drives of the future.

GLEASON

GLEASON WORKS

Builders of Bevel Gear Machinery for Over Seventy-five Years

1000 UNIVERSITY AVENUE, ROCHESTER 3, N. Y., U. S. A.

A GOOD MACHINE IS MORE THAN HALF OF THE WORK!

CINCINNATI

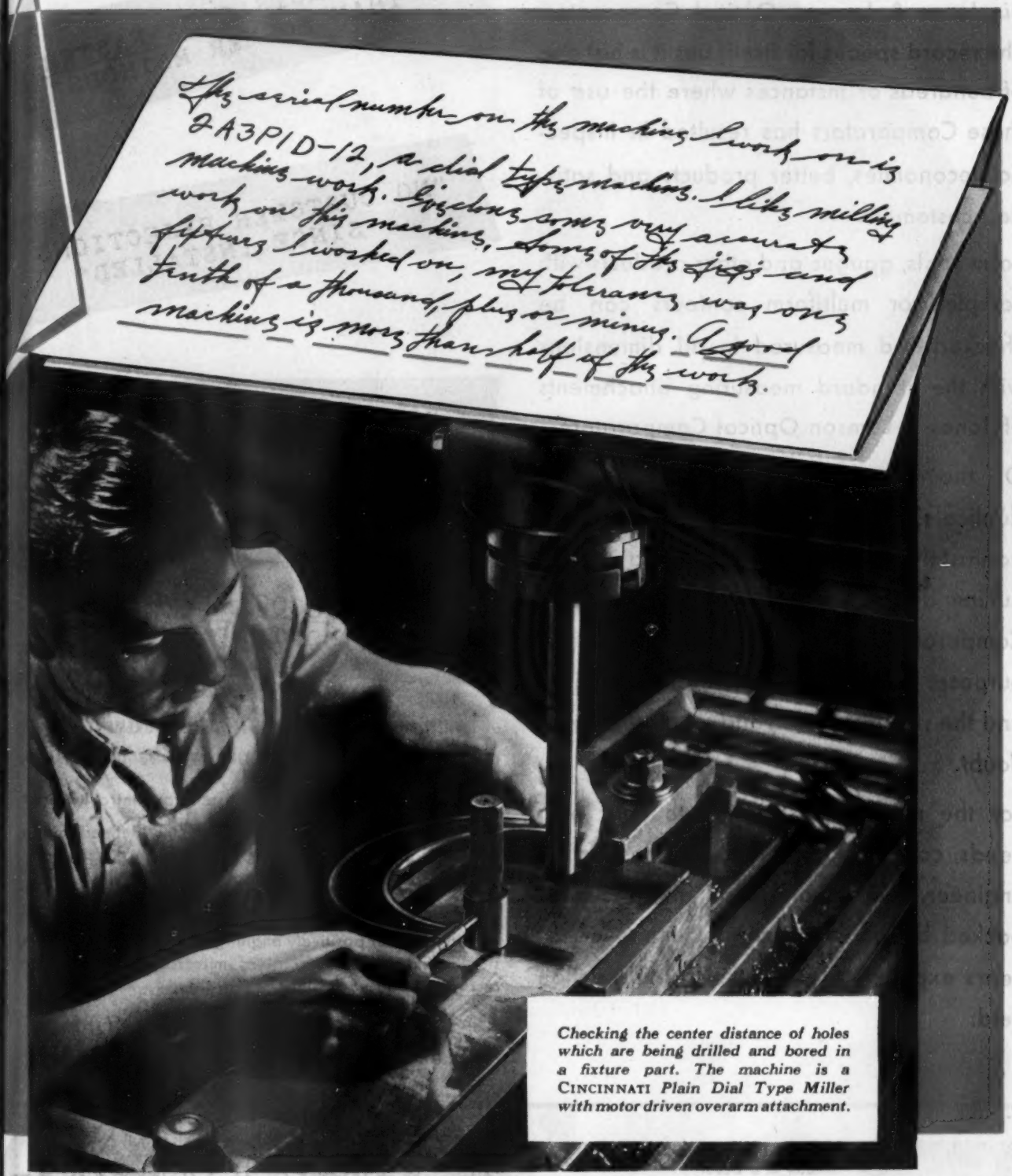
CINCINNATI No. 3 Plain Dial Type Miller. Dial Types are available in Plain, Universal and Vertical styles, Nos. 2, 3, and 4 sizes, Medium and High Speed Ranges. Catalog M-970-2, containing complete specifications, will be sent on request. For a brief description, look in Sweet's Catalog File.

The observation of the operator who wrote this letter, a part of which is reproduced on the opposite page, is borne out in many case histories attesting to the accuracy, versatility and dependability of CINCINNATI Dial Type Milling Machines. Such reports are not unusual because the Dial Type is built to give dependable service on a wide range of operations and over long periods of time. ¶ These machines are exceedingly easy to manipulate because power speed and feed changes, a complete set of hand and power controls, front and rear, and many other mechanical refinements lighten considerably the operator's burden and responsibility. Investigate the adaptability of CINCINNATI Dial Type Milling Machines to your own work.

Keep on buying WAR BONDS

THE CINCINNATI M

MILLING MACHINES


The serial number on the machine I work on is
2A3P1D-12, a dial type machine. I like milling
machine work. Lots of times very accurate
work on this machine, some of the jigs and
fixtures I worked on, my tolerance was one
tenth of a thousand, plus or minus. A good
machine is more than half of the work.

Checking the center distance of holes which are being drilled and bored in a fixture part. The machine is a CINCINNATI *Plain Dial Type Miller with motor driven overarm attachment.*

MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

This, in brief, is what a manufacturer of precision tools and gauges has to say about *his* Jones & Lamson Optical Comparator. The record speaks for itself, but it is just one of hundreds of instances where the use of these Comparators has resulted in inspection economies, better products and satisfied customers.

Form tools, gauges and other products with complex or multiform contours can be checked and measured in all dimensions with the standard measuring attachments of Jones & Lamson Optical Comparators.

Or, the inspection of large quantities of duplicate parts can be made rapidly and accurately, by comparison with a master outline drawn upon the glass screen, on Comparators designed specifically for this purpose. There is a model for every job, and the results are *beyond a shadow of a doubt.*

For the method best suited to your own needs, consult a Jones & Lamson inspection engineer. There is one near you, and he is backed by an organization with over 20 years experience in the optical inspection field.

"INSPECTS 200% FASTER THAN FORMER METHODS"

"NO CUSTOMER REJECTIONS SINCE INSTALLED"

"CHECKS ACCURATELY IN ALL POSITIONS"

"CHECKS .0002" TOLERANCES ON CONTOUR GAGES"

WHEN PURCHASING EQUIPMENT FOR MEASUREMENT AND INSPECTION BY OPTICAL PROJECTION, YOU SHOULD DEMAND:

1. Precision Condensing Lens System for controlling light.

2. Projection lenses that project a sharply defined image, free from distortion and color, *anywhere on the screen.*

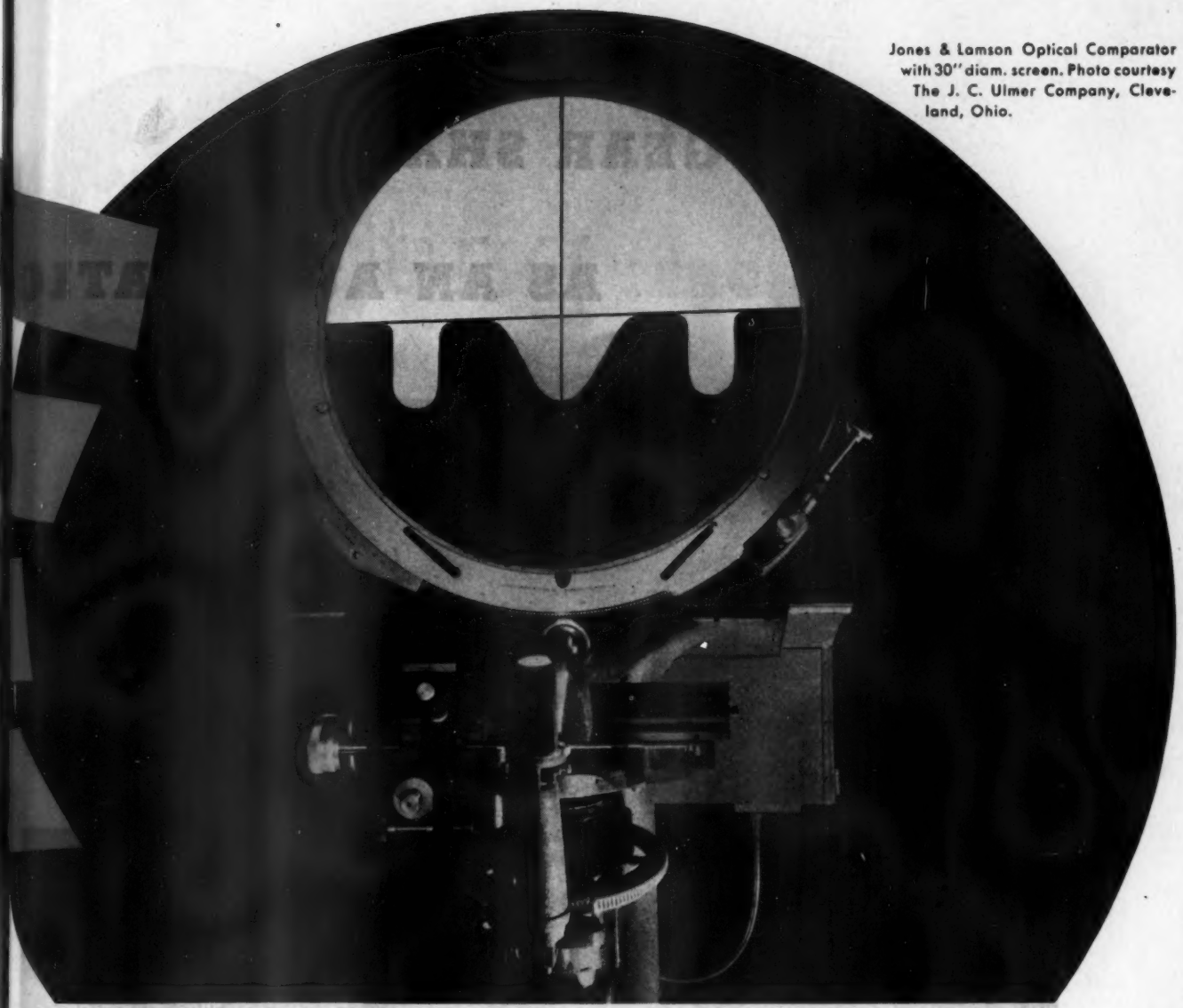
3. Optically Flat Reflection Mirrors *sufficiently thick* to insure *permanent* flatness.

4. Provision for positively aligning the illuminating system, staging fixtures, projection lens, mirror and screen in correct relation to each other.

5. Rigid Machine Construction.

This book "Beyond a Shadow of a Doubt" will tell you more about our Optical Comparators and what they are doing.

DID YOU KNOW...
THAT JONES & LAMSON OPTICAL COMPARATORS ARE USED TO INSPECT PRECISION-MADE COMPONENTS OF THE DRY SHAVERS THAT REMOVE YOUR WHISKERS SO SMOOTHLY AND RAPIDLY.



Jones & Lamson Optical Comparator with 30" diam. screen. Photo courtesy The J. C. Ulmer Company, Cleveland, Ohio.

JONES & LAMSON

MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

OPTICAL COMPARATORS

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

BENCH COMPARATOR WITH 14" DIAM. SCREEN & MEASURING ATTACHMENTS

STANDARD BENCH COMPARATOR

BENCH COMPARATOR 14" DIAM. SCREEN

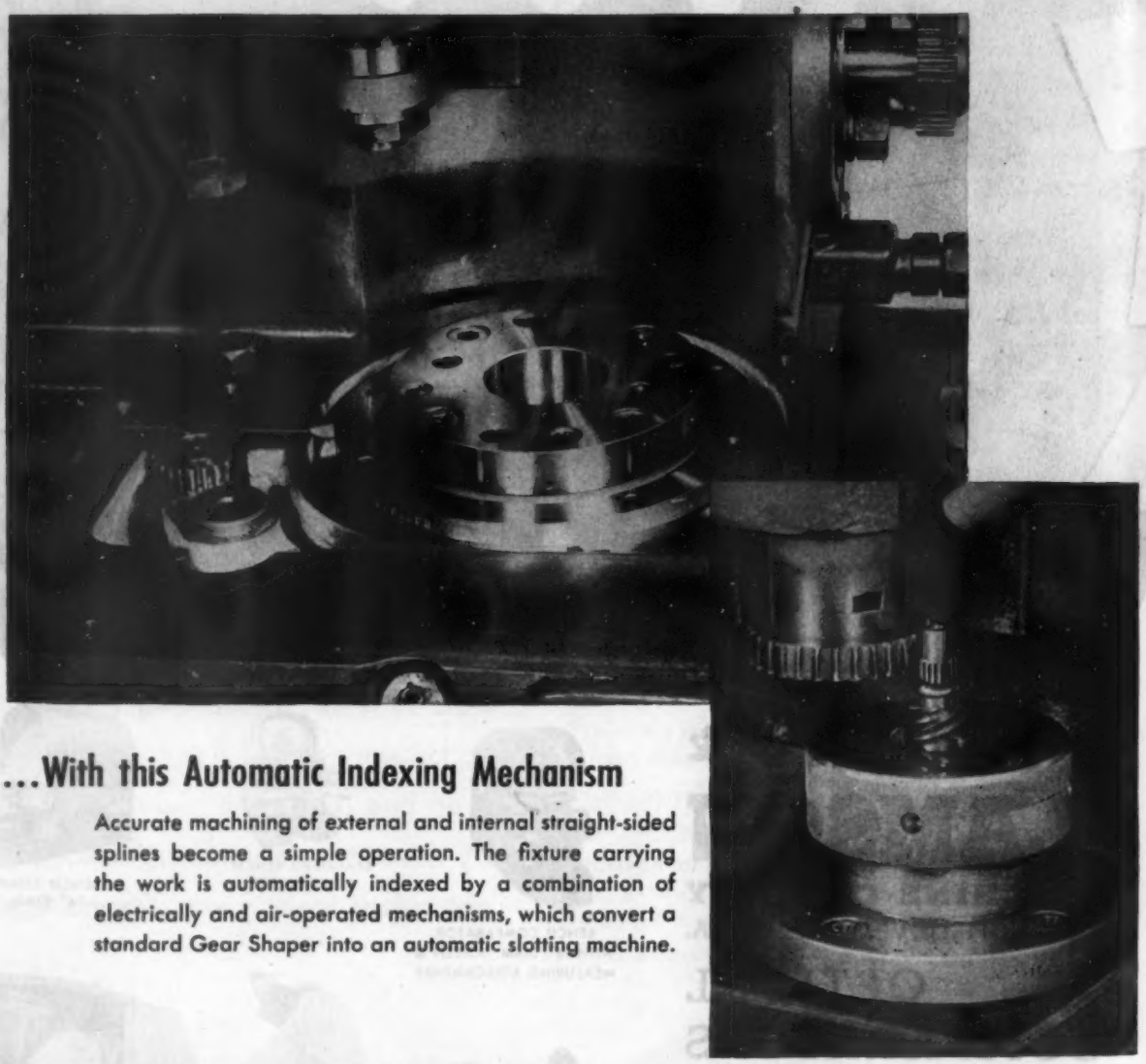
DIRECT PROJECTION COMPARATOR

STANDARD PEDESTAL COMPARATOR

PEDESTAL COMPARATOR 22" — 30" DIAM. SCREENS

THE GEAR SHAPER

AS AN AUTOMATIC



...With this Automatic Indexing Mechanism

Accurate machining of external and internal straight-sided splines become a simple operation. The fixture carrying the work is automatically indexed by a combination of electrically and air-operated mechanisms, which convert a standard Gear Shaper into an automatic slotting machine.

THE FELLOWS METHOD... MACHINES AND TOOLS FO

Slotting MACHINE...

Aeroplane engine and parts manufacturers use large quantities of straight-sided splined parts, both of the external and internal variety. These parts must be accurately machined, and in most cases close fits must be maintained between mating external and internal members.

7- and 7A-type Fellows Gear Shapers have been converted to handle this work automatically by providing the machines with indexing attachments and auxiliary operating equipment.

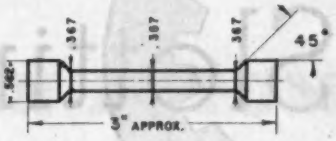
For cutting external splines, the cutter is usually made in circular form with a number of similar-shaped spline teeth equally spaced around its circumference. Of course, only one spline tooth on the cutter is used at one time, and when one tooth becomes dull, the cutter is indexed to bring another tooth into action.

For cutting internal splines—especially when the hole in the work is of comparatively small diameter—a single-tooth cutter is used. This method of cutting splines presents the only practical means of accomplishing the work when the spline ends in a "blind" hole or runs into a recess.

Fellows Gear Shapers can be provided with many other attachments and special fixtures, which enable them to perform operations that would otherwise require the use of special-purpose machines. It will pay you in your post-war planning to contact the Fellows Engineers. Write for literature. The Fellows Gear Shaper Company, Springfield, Vermont — or 616 Fisher Bldg., Detroit 2, Mich., or 640 West Town Office Bldg., Chicago 12, Ill.

Fellows

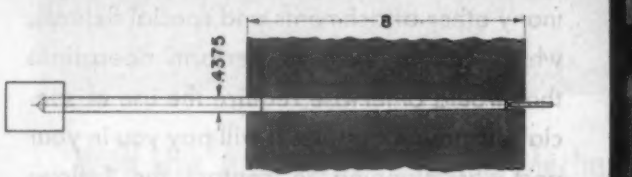
ALL OPERATIONS FROM BLANK TO FINISHED GEAR



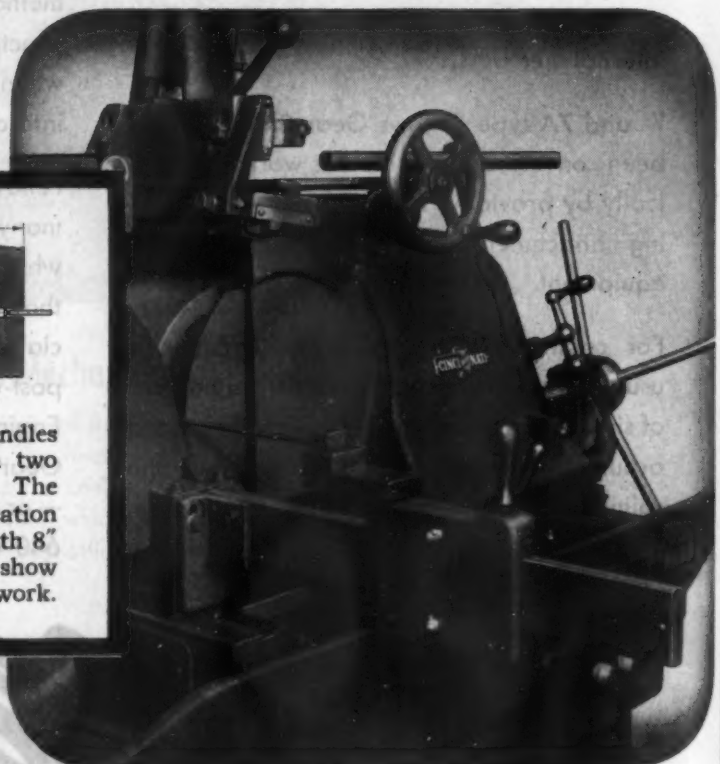
The No. 2 Centerless at the left has been tooled up by Cincinnati Application Engineers to grind tensile test specimens *from the solid,* removing .205" at the smallest diameter. This is about 10 times the usual stock allowance. The sketch above shows the dimensions of the part.

GRINDING

CINCINNATI



Right: Grinding the taper on textile spindles *from the straight bar,* removing 3/16" in two cuts, measured at the small end of the part. The machine, tooled up by Cincinnati Application Engineers, is a No. 2 Centerless Grinder with 8" wide wheels. This illustration and sketch show the end-feed method, principally for taper work.



Keep on buying WAR BONDS

CINCINNATI

CENTER TYPE GRINDING MACHINES

CINCINNATI No. 2 Centerless.
Catalog G-456-2 sent on request

OFF A LOT OF METAL

FAST

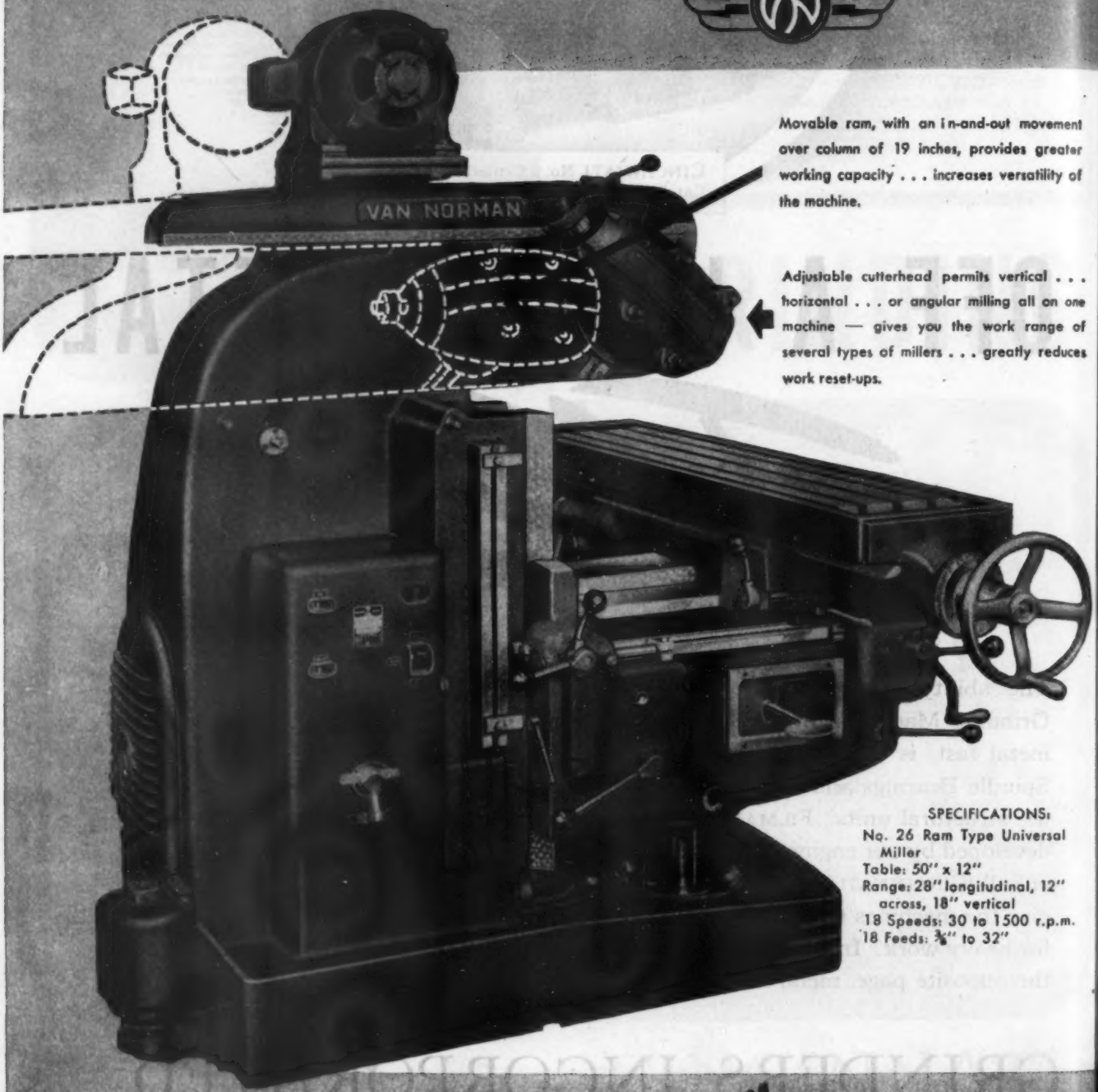
The ability of CINCINNATI Centerless Grinding Machines to take off a lot of metal fast, is due largely to FILMATIC Spindle Bearings and the ruggedness of the structural units. FILMATIC bearings, developed by our engineers, are standard on all CINCINNATI Grinders, and help give the machines the stamina necessary for heavy work. In both illustrations on the opposite page, metal removal is unusually heavy. ¶ Perhaps some of the parts you are now manufacturing could be handled better and more economically by the centerless method. Why not talk it over with the Cincinnati Application Engineers? They will be glad to give you the benefit of more than twenty years' experience in the application of either centerless or centertype methods to grinding jobs.

GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

VAN NORMAN



Movable ram, with an in-and-out movement over column of 19 inches, provides greater working capacity . . . increases versatility of the machine.

Adjustable cutterhead permits vertical . . . horizontal . . . or angular milling all on one machine — gives you the work range of several types of millers . . . greatly reduces work reset-ups.

SPECIFICATIONS:
No. 26 Ram Type Universal Miller
Table: 50" x 12"
Range: 28" longitudinal, 12" across, 18" vertical
18 Speeds: 30 to 1500 r.p.m.
18 Feeds: 3/8" to 32"

"It pays to

UNIVERSAL
MILLING MACHINES

Produce More Work with Less Man Hours

Van Norman Ram-Type Universal Millers increase machine and operator output by as much as 40%. How? By reducing idle machine time caused by work reset-ups.

With the Van Norman Universal Milling Machine, the operator changes the position of the cutterhead . . . from horizontal to angular . . . or vertical position . . . instead of the workpiece. The cutterhead is mounted on a movable ram which can be moved in or out permitting the operator to handle all milling operations, whether it be small or large work, with minimum set-ups. The net result is greater machine capacity, faster work with less possibility of errors.

In addition, such Van Norman features as — directional front and rear controls of all power feeds, solid machine rigidity, single selector speed and feed change levers, large easy-to-read dials — all add up to increased output and reduced costs.

Find out about the Van Norman Ram-Type Universal Millers, today. Write for bulletin.

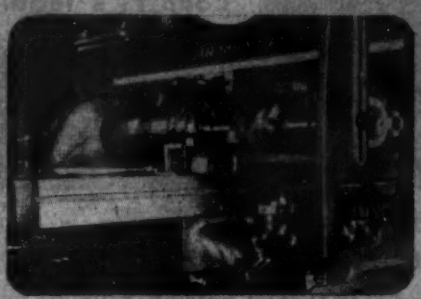
VAN NORMAN COMPANY

SPRINGFIELD, MASSACHUSETTS

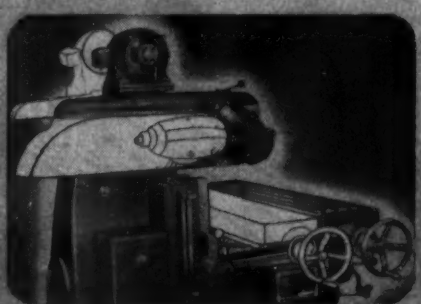
Van Normanize"

VERTICAL MILLING — In the illustration, the operator is vertical-milling a recess in the workpiece.

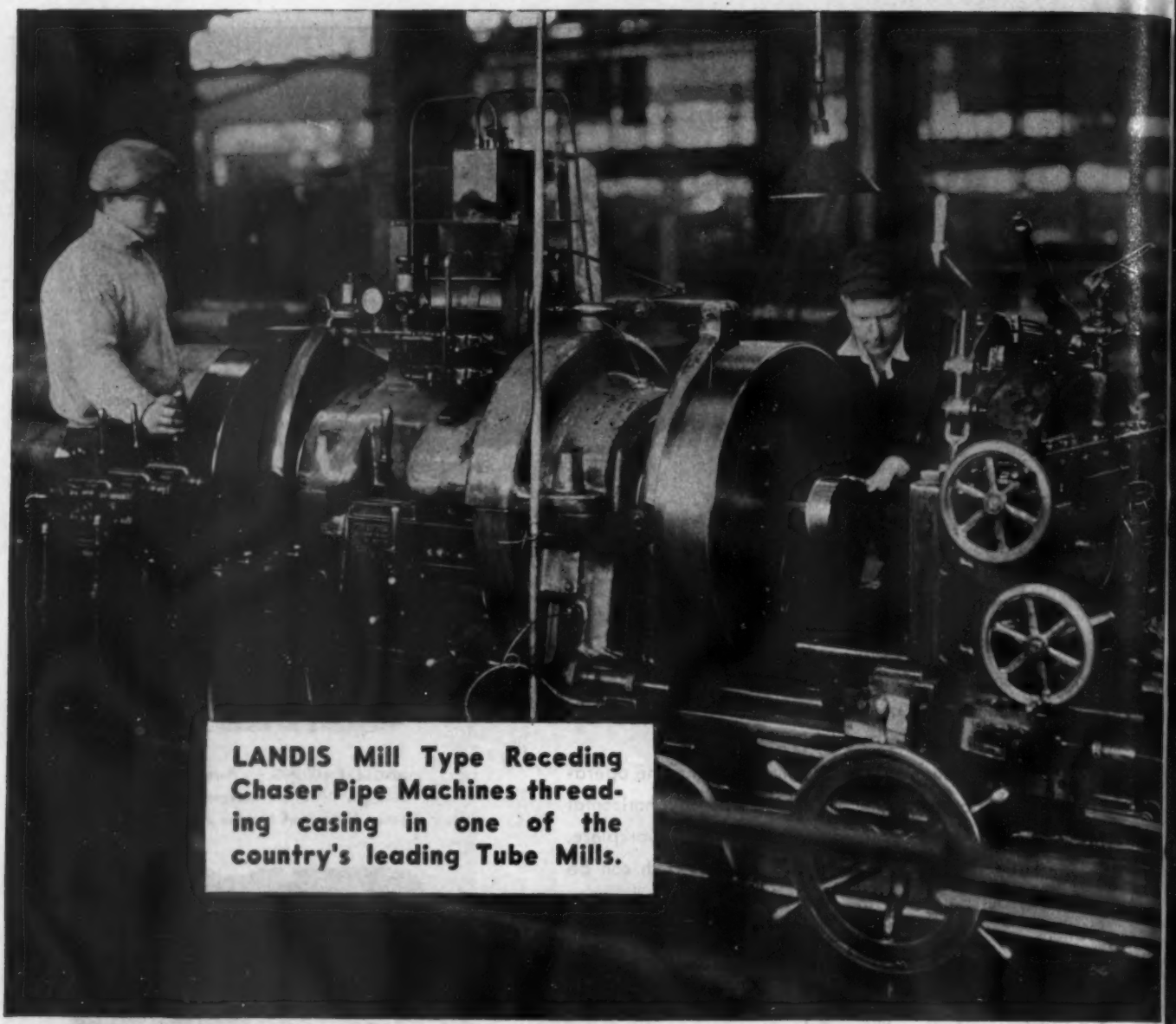
ANGULAR MILLING — Here, the operator is milling a "V" in the workpiece. Note that the set-up of the work is in the original position.



HORIZONTAL MILLING — With the head locked in the horizontal position, the machine is used for a boring and facing operation.



Adjustable cutterhead and movable ram in combination with the saddle cross feed provides maximum milling capacity and versatility.



LANDIS Mill Type Receding Chaser Pipe Machines threading casing in one of the country's leading Tube Mills.

THE LANDIS CHASER

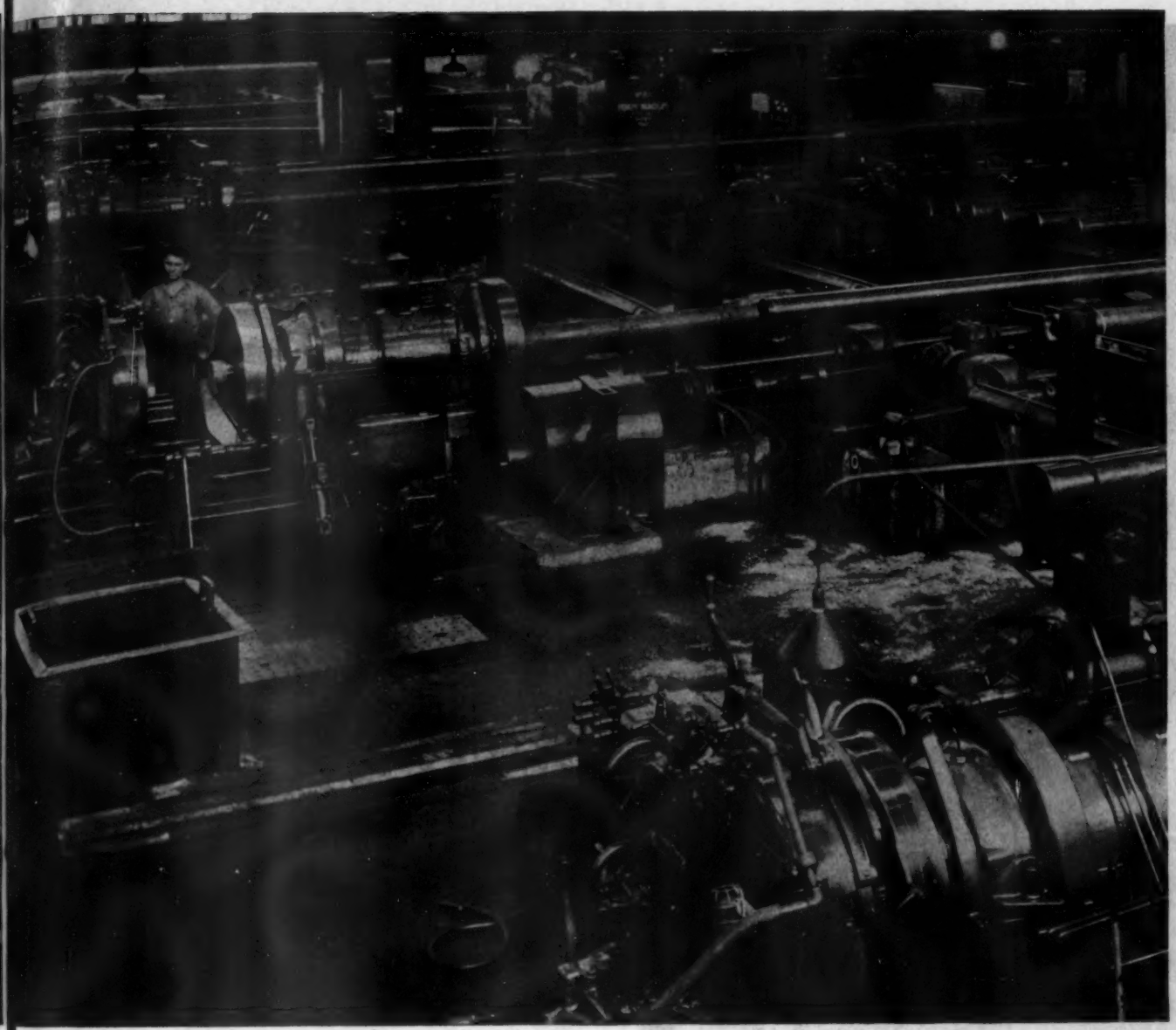
The finest thread cutting tool in industry.

Maintaining

Write for Bulletin No. C-77

LANDIS

THREADING MACHINERY · THREAD CUTTING DIE HEADS



Exacting A.P.I. Specifications

Tube Mills throughout the country are using Landis Receding Chaser Pipe Machines for the High Production Threading of Oil Well Casing, Tubing and Drill Pipe.

The Landis Mill Type Threading Machine with the Receding Chaser Die Head has proven most dependable in maintaining the exacting accuracy of A.P.I. Specifications. In addition, this machine has unrivaled production ability plus a remarkably low operating cost.

MACHINE CO. WAYNESBORO PENNA. U.S.A.

COLLAPSIBLE TAPS • PIPE THREADING AND CUTTING MACHINES

Precision for the Pacemaker

with

TIMKEN BEARINGS ON THE SPINDLE!

"American" Pacemaker Lathe—14 inch, 16 inch, 18 inch, 20 inch, and 22 inch; all equipped with Timken Bearing spindles.

Spindle of "American" Pacemaker Lathes showing application of Timken Bearings.

Timken Tapered Roller Bearings not only have kept pace with machine tool developments for many years, but constantly have anticipated progressive demands for increased speed, precision and endurance in equipment of all kinds —lathes, milling machines, drilling machines, grinders, boring machines, etc.

Thus on the spindle of the "American" Pacemaker, latest model lathe of The American Tool Works Company, Cincinnati, Timken Bearings again are demonstrating their unequalled capacity for maintaining spindles uniformly rigid and free from chatter at all speeds, feeds and cutting loads.

Timken Bearing Equipped spindles have paced America's spectacular and victorious war production drive; they will be in the forefront of the competitive campaigns of peace. Make sure you have them in your new machines. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

Simple as... ...YET THEY MUST BE *Right!*

Milling Machine Vises may look like simple "gadgets" — but actually they are precision tools, with operating surfaces accurately ground to size and squareness and built to take hard, everyday punishment.

It is only reasonable that a manufacturer of milling machines is best equipped to produce milling machine vises. Kempsmith has specialized in building precision-built milling machines and equipment for *more than a half-century*. That's why you'll find it pays to buy Milling Machine Vises and other Milling Attachments from Kempsmith.

Write today for literature.

THE KEMPSMITH MACHINE COMPANY
1823 So. 71st St., Milwaukee 14, Wis., U. S. A.

Vises BY KEMPSMITH

Write Today

Bulletin No. 117, describing Kempsmith Vises, is just off the press. Fill in and mail coupon for your copy.

Precision Built Milling Machines Since 1888

KEMPSMITH—Yes, I would like to receive a copy of Bulletin No. 117. Mail to:

Name..... Title.....

Firm..... Address.....

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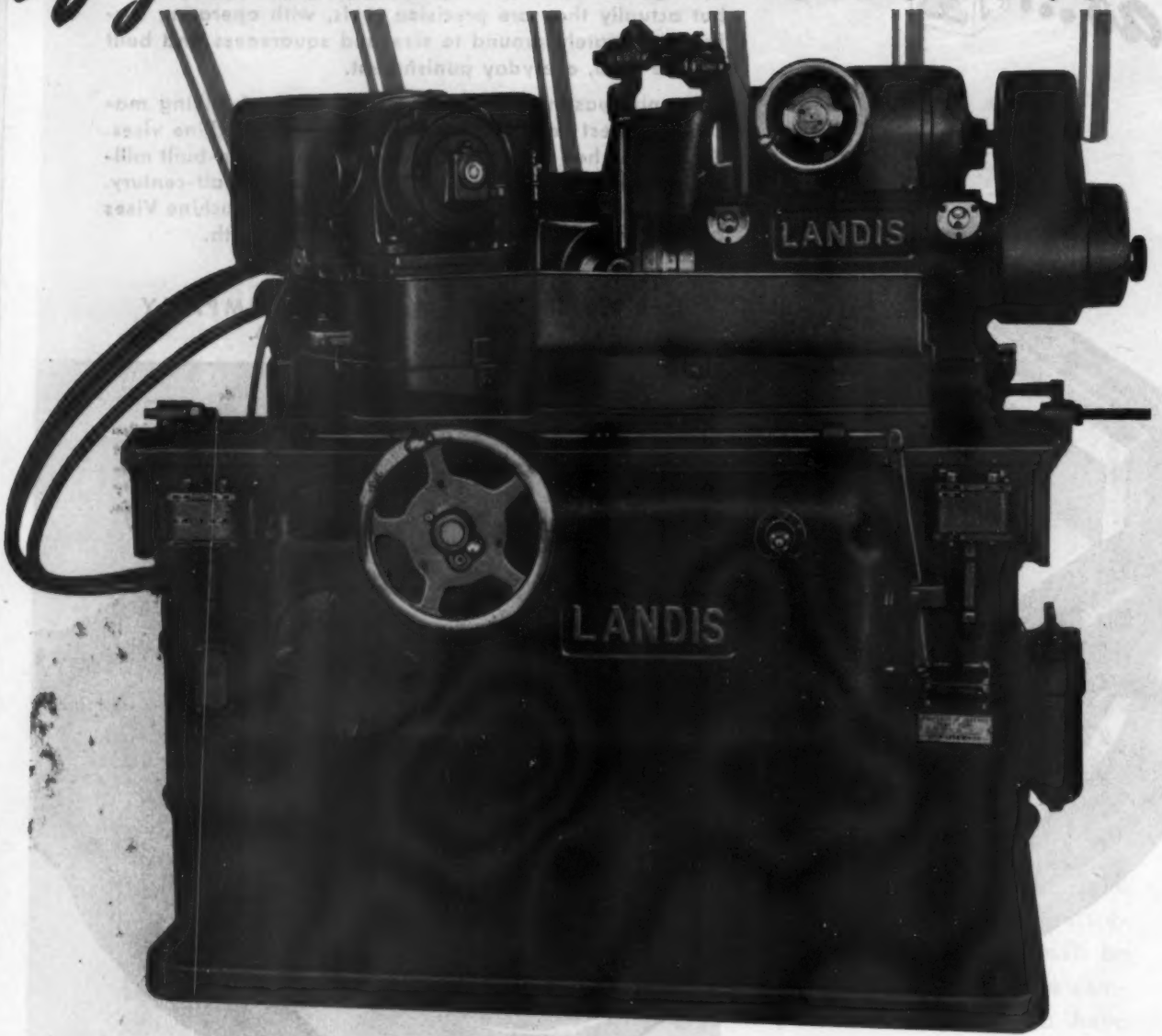
If you want PRODUCTION



LANDIS 6" TYPE-C HYDRAULIC VALVE FACE GRINDER
*** Semi-automatic * High production * Precision output**

LANDIS TOOL
Precision Grinders

LANDIS TOOL CO.

plus PRECISION in Grinding Valves—

Look to the Established Leader in the manufacture of Valve Grinders

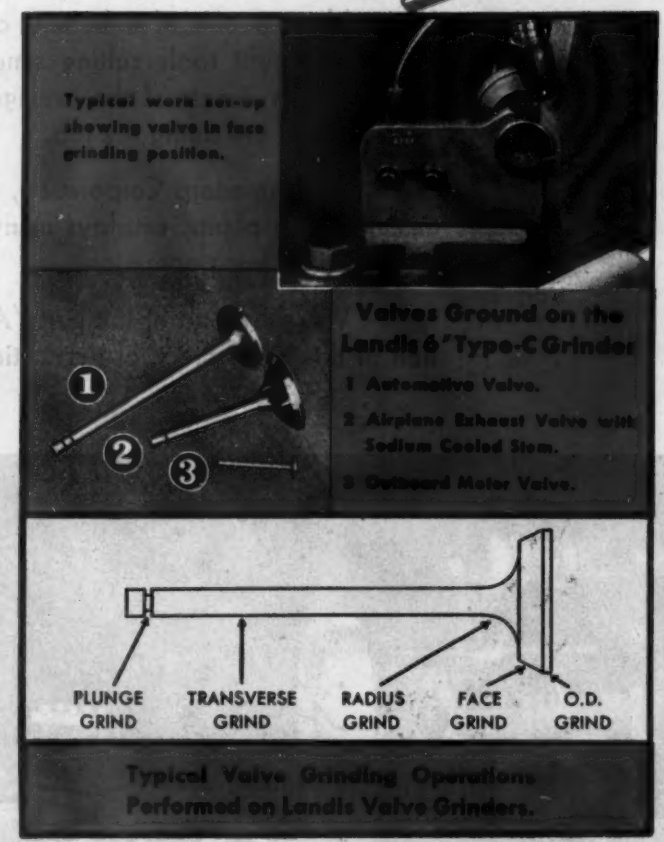
When highly developed airplane valves with extremely close tolerances were demanded in great volume, the aircraft industry turned to Landis Tool as the leading producer of valve grinders for the automotive industry over many years.

For the operations involved, face grinding in particular, the Landis 6" Type-C Hydraulic Valve Face Grinder was found to be most effective in producing desired results. It is semi-automatic; so simplified as to require only manual loading and unloading, and manipulation of a single control.

Production speeds of 300 to 600 per hour are possible depending on the tolerance required and the diameter of the valve head. Concentricity of the valve face with the stem can be maintained within a limit of .0005"while the micrometer feed dial allows feed settings as close as .0001" in terms of work diameter.

Take advantage of the valve grinding experience of the largest manufacturer of grinders for valves. Get in touch with Landis Tool engineers for help on valve grinding problems, or write for Catalog G43.

13


Typical work set-up showing valve in face grinding position.
Valves Ground on the Landis 6" Type-C Grinder
1 Automotive Valve.
2 Airplane Exhaust Valve with Sodium Cooled Stem.
3 Outboard Motor Valve.
PLUNGE GRIND
TRANSVERSE GRIND
RADIUS GRIND
FACE GRIND
O.D. GRIND
Typical Valve Grinding Operations Performed on Landis Valve Grinders.

"Better Grinding" explains the basic principles of precision grinding. Invaluable for both the operator and the man responsible for grinding. Write for your copy today.

LANDIS TOOL Company

WAYNESBORO, PA.

Speeding Deliveries

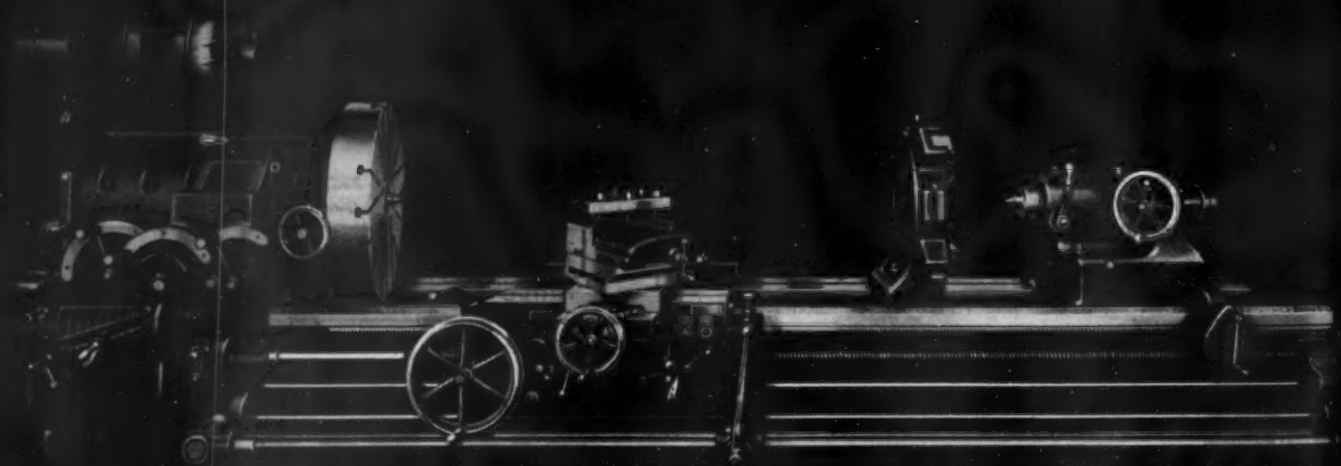
TO THE AXIS !

"American" Lathes are doing a real speed-up job in producing torpedoes for "delivery to the Axis".

Here is one of a battery of 42" "Americans" machining torpedo air flasks with eight tools cutting simultaneously. This job demands power and stamina far in excess of the average lathe job. "Americans" were selected—"Americans" are doing the job.

The Amertorp Corporation, one of the world's largest and finest torpedo manufacturing plants, employs many "American" Lathes for a great variety of torpedo machining operations.

We are proud of the part "American" Lathes are playing in the production of this masterpiece of destruction.



THE AMERICAN TOOL W

LATHES AN RA

CINCINNATI OH

OLWORKS COMPANY
N RADIAL DRILLS
TI OHIO, U. S. A.

Announcing...

Vitrified Bonded Diamond Chip Breaker Wheels now available in stock

Their performance is outstanding:

"Grinds 20,000 chip breakers compared with 1200 to 1500 with resinoid diamond wheels."

"Ground 2404 tools with 1/8" wear compared with 1350 with 1/4" wear of resinoid diamond wheels."

"Lasts four times as long as the best resinoid bonded diamond wheel."

"Cutting faster than resinoid."

In stock:

4" x 1/4" x 5/8" or 1 1/4"	D100S-N100V	1/8"
	D120 -N100V	1/8"
	D150 -P100V	1/8"
6" x 1/4" x 5/8" or 1 1/4"	D150 -P100V	1/8"

Order today to give your own tool room the advantages of this outstanding development of the Norton Research Laboratories.

Large scale production of the popular 6" x 3/4" cup and other sizes of Norton Vitrified Diamond Wheels will start early in 1945.

NORTON COMPANY, WORCESTER 6, MASS.

W-981

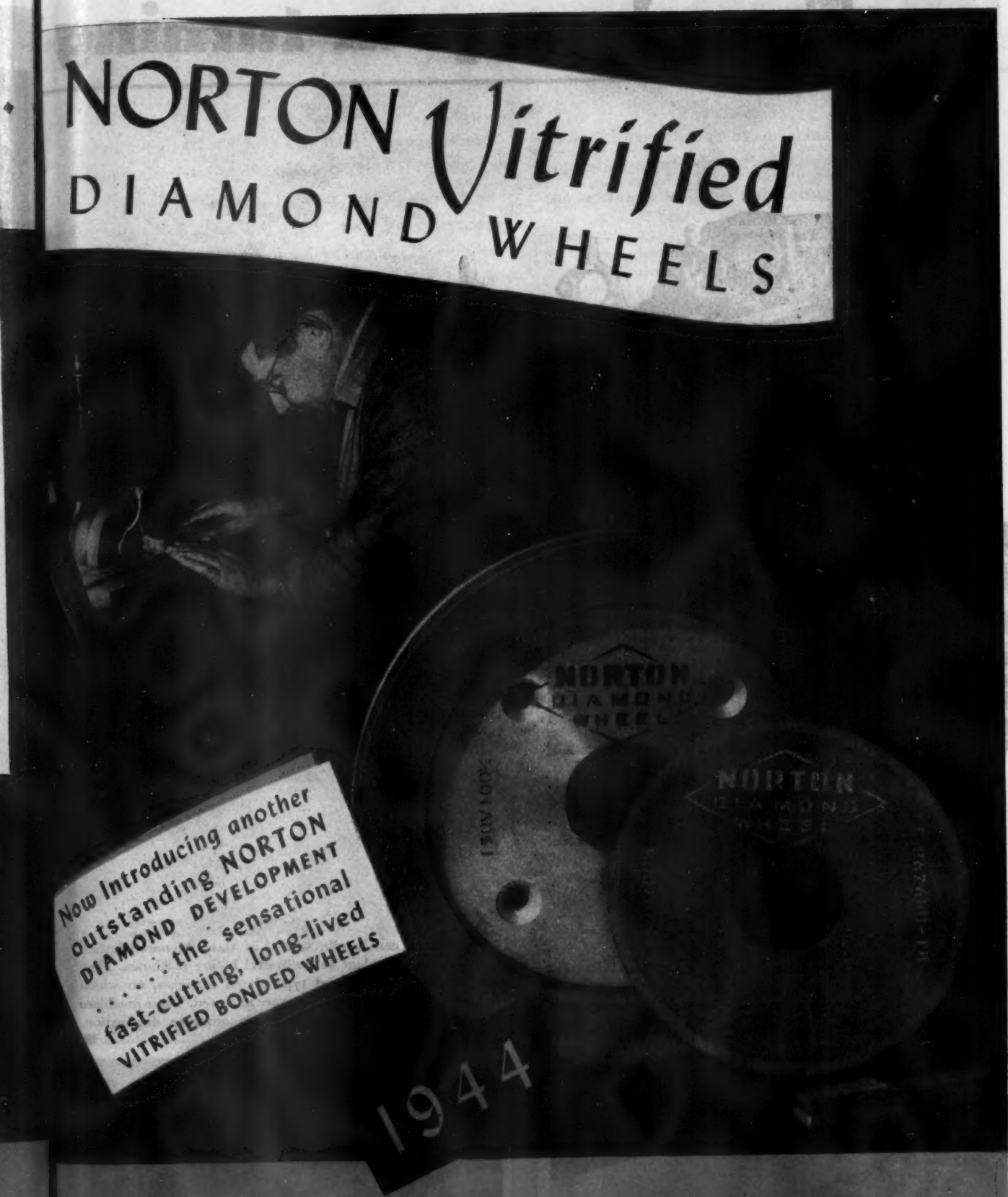
Norton Introduced RESINOID Bonded DIAMOND WHEELS

1934

Norton Introduced METAL Bonded DIAMOND WHEELS

1939

NORTON Vitrified DIAMOND WHEELS

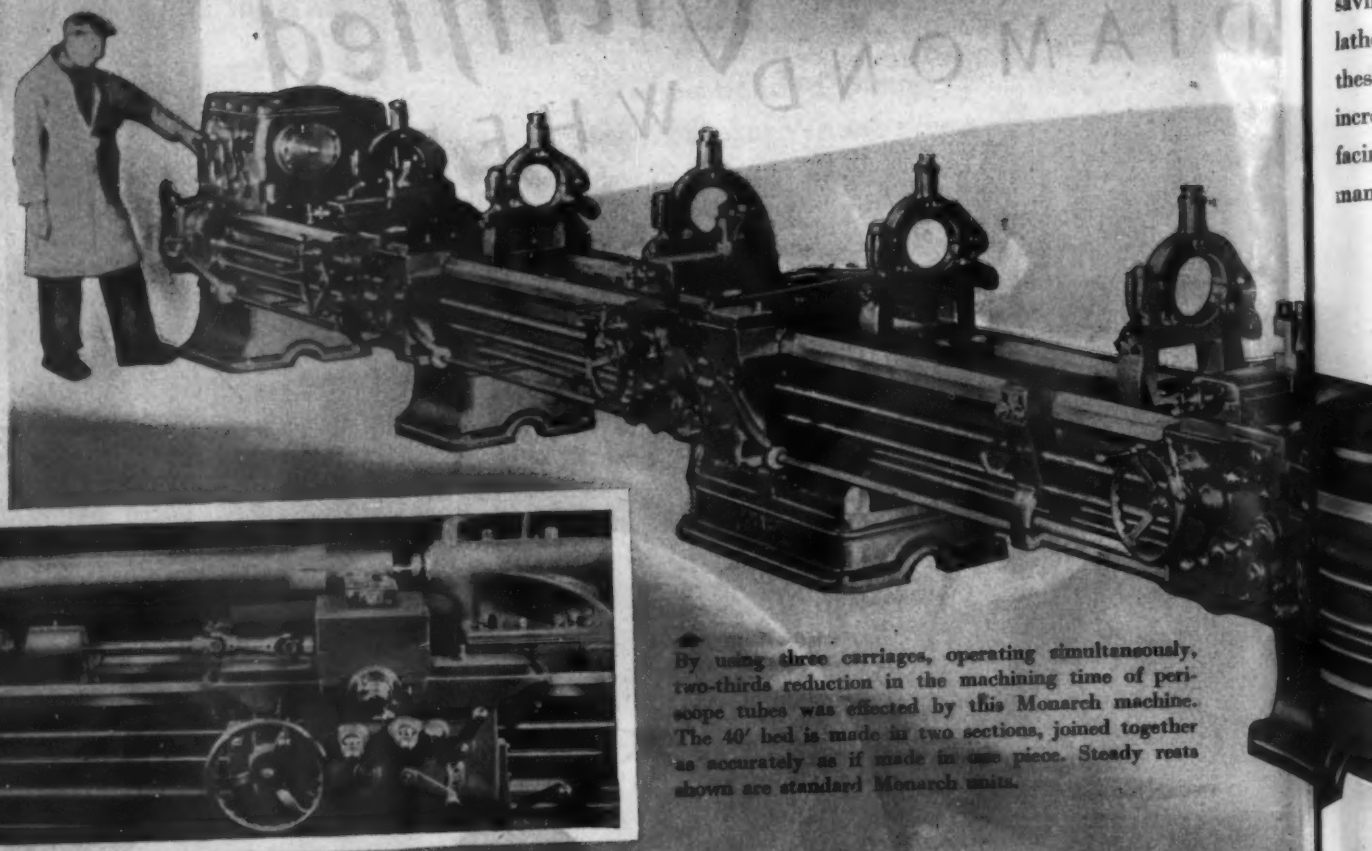


Now Introducing another outstanding NORTON DIAMOND DEVELOPMENT ..... the sensational fast-cutting, long-lived VITRIFIED BONDED WHEELS

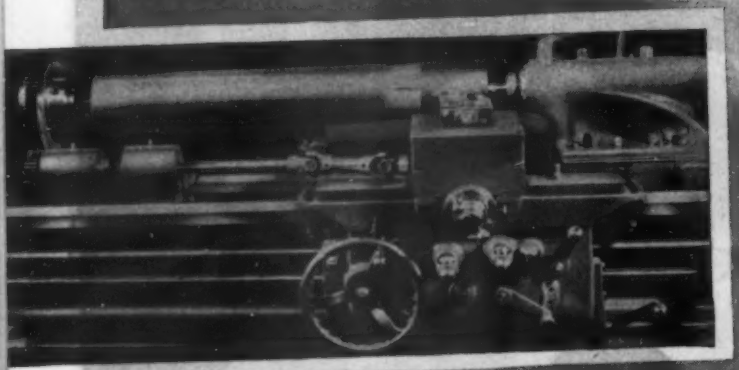
1944

NORTON ABRASIVES

To reduce your turning



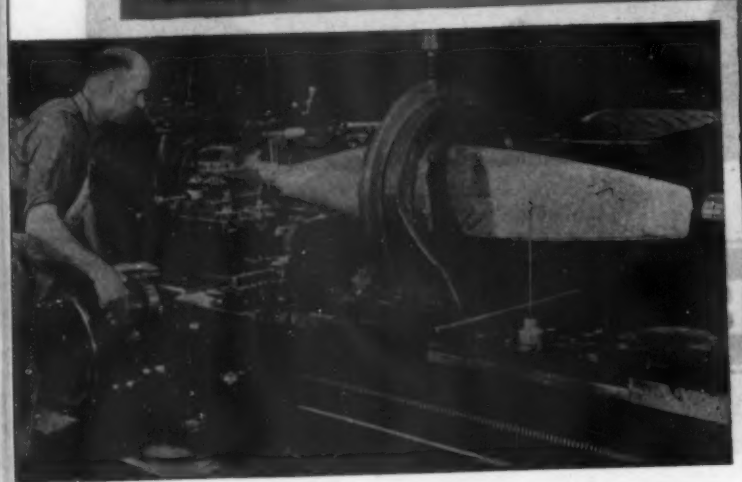
By using three carriages, operating simultaneously, two-thirds reduction in the machining time of periscope tubes was effected by this Monarch machine. The 40′ bed is made in two sections, joined together as accurately as if made in one piece. Steady rests shown are standard Monarch units.

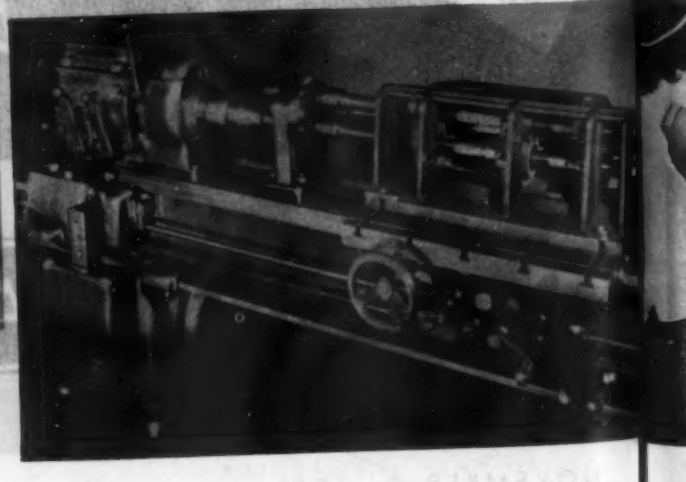


A special contour shape turning device on this standard Monarch lathe was developed to speed delivery of landing gear struts. A large number of these special Monarchs are used in all plants producing this work.

Machining the hub end of this propeller blade requires 13 tools, but is done in one setup on this Monarch lathe. One large propeller plant uses several of these lathes for this purpose.

One operator can handle several of these Monarch lathes, used in our own plant as horizontal boring machines. They are equipped with special type platen carriages, on which the work-holding boring fixtures are mounted. These machines reduce production costs and assure accurate duplication.





costs... SEE MONARCH

Illustrated here are a few of the many ingenious time-saving applications of standard or special Monarch lathes for war production. Postwar, machines such as these will more than pay their way by delivering increased output of high quality turning, boring or facing work. Especially, they will help offset higher man power costs. If you would like a demonstration of how Monarch turning machines can be profitably applied to your work, our engineers are at your service.

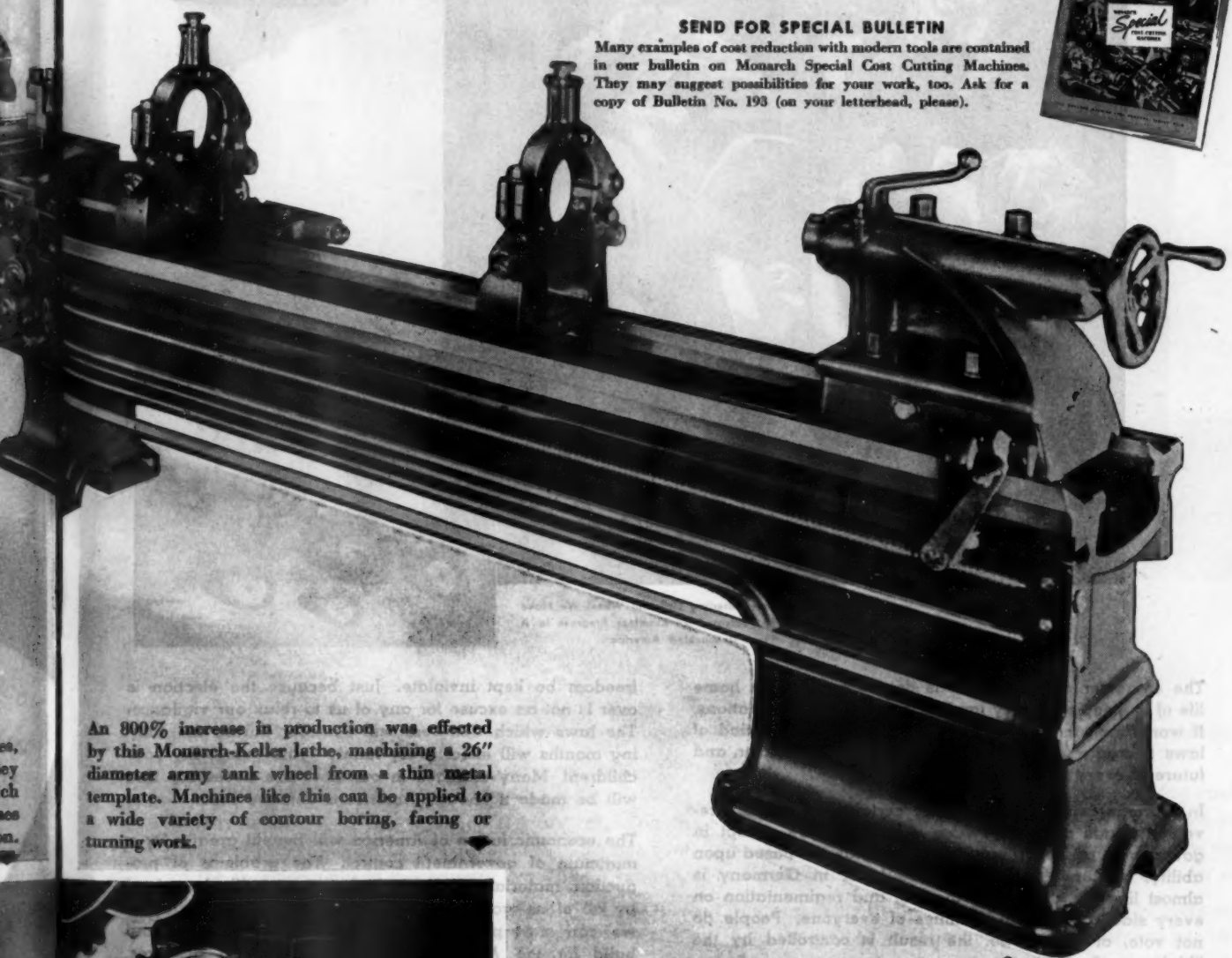
THE MONARCH MACHINE TOOL COMPANY · SIDNEY, OHIO

DIRECT FACTORY BRANCHES:

801 Fisher Bldg., Detroit 2, Mich.
622 W. Washington Blvd., Chicago 6, Ill.
1060 Broad Street, Newark 2, N. J.
512 Empire Bldg., Pittsburgh 22, Pa.
10465 Carnegie Ave., Cleveland 6, Ohio
Representatives in principal cities

SEND FOR SPECIAL BULLETIN

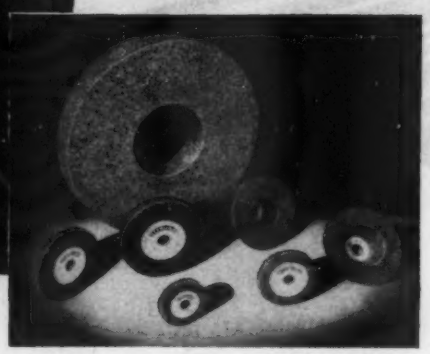
Many examples of cost reduction with modern tools are contained in our bulletin on Monarch Special Cost Cutting Machines. They may suggest possibilities for your work, too. Ask for a copy of Bulletin No. 193 (on your letterhead, please).



An 800% increase in production was effected by this Monarch-Keller lathe, machining a 26" diameter army tank wheel from a thin metal template. Machines like this can be applied to a wide variety of contour boring, facing or turning work.

Monarch Saves Time

LETS RING IT AGAIN!



Every Sterling Grinding Wheel We Make Is Dedicated To Limitless Progress In A Free, Unshackled America

The character of any nation is determined by the home life of its people. Happy families build prosperous nations. It works the other way, too. Government, by the kind of laws it creates, can greatly influence the character and future of every family.

In German-dominated countries, certain restrictions prevented heads of families from obtaining work except in government approved industries. Pay was not based upon ability, but upon edict. Imported labor in Germany is almost literally chained to the job, and regimentation on every side controls the destinies of everyone. People do not vote, or if they do, the result is controlled by the "higher ups".

America needs to be watchful in order that its heritage of freedom be kept inviolate. Just because the election is over is not an excuse for any of us to relax our vigilance. The laws which Congress will consider during the coming months will effect every family—you, your wife, your children! Many changes in our laws are necessary and will be made if enough Americans demand them.

The economic future of America will benefit greatly by a minimum of government control. The problems of production, materials, and distribution can readily be solved by all of us working toward a common goal. Together, we can start peacetime prosperity on the march and build for the American family the future it deserves.

The Liberty Bell—let's ring it again!

· STERLING ABRASIVES ·

THE STERLING GRINDING WHEEL DIVISION

OF THE CLEVELAND QUARRIES COMPANY

TIFFIN, OHIO

THE WHEELS OF INDUSTRY

HERO ★★★

Soon he'll be home from the wars—triumphantly home . . . to what?

The cold facts are these:

Nearly one-third of our fighting men are returning to "homes" that are without running water . . . 35 per cent of the dwelling units in this country are without sanitary plumbing or bathing facilities of any kind . . . and American slums have bred the highest rate of juvenile crime in our history.

In short, there's still a war to be won here at home!

Our weapons are the mightiest on earth. Our manufacturing productivity is equal to half the world's total capacity . . . our basic economy and our currency are sound . . . and our faith in the American Ideal is stronger than ever before.

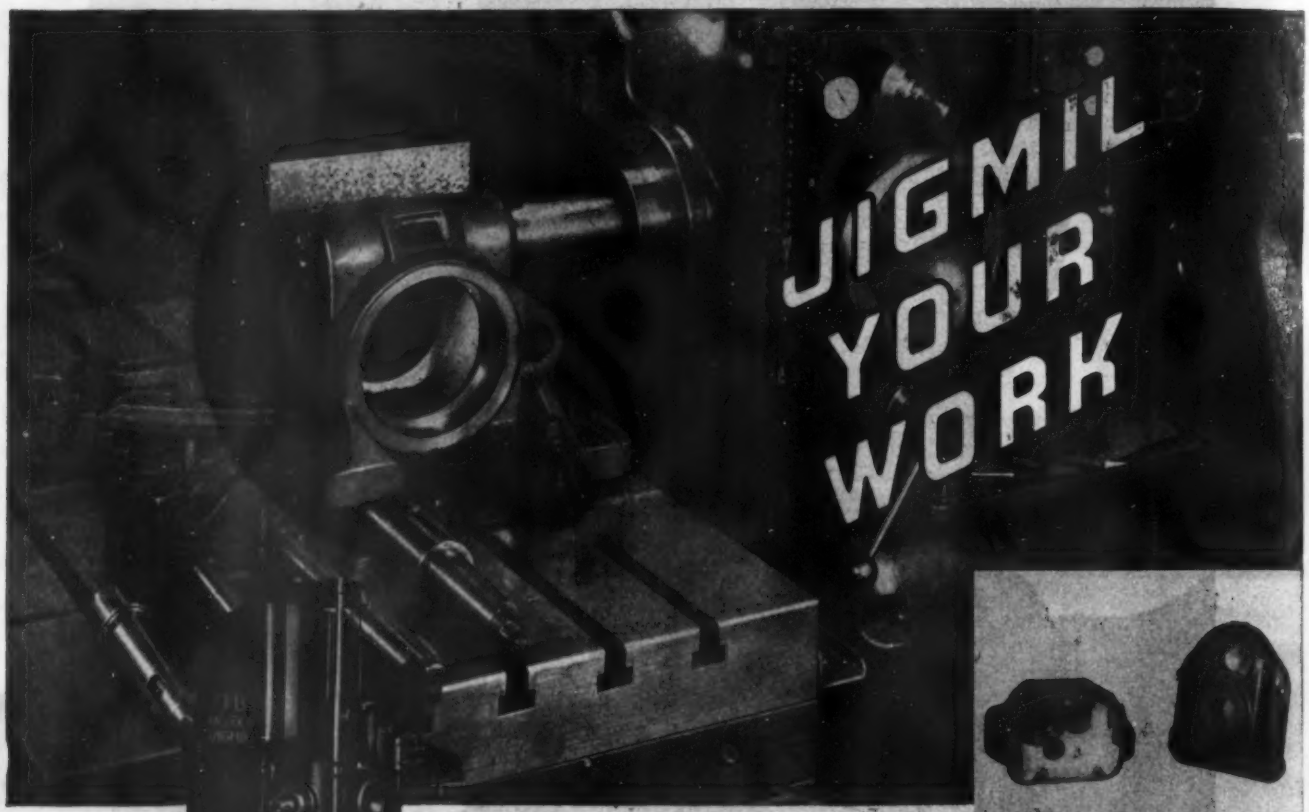
The time to start fighting that war is now. Delay could mean defeat, and the loss of all that our sons have fought and died for. Victory will mean a great new age of peace and prosperity, with jobs and security for all.

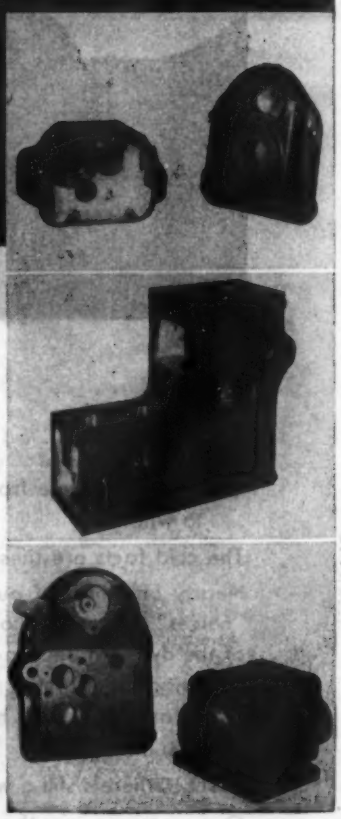
The engineers of the basic machine tool producers can help the men of government and of industry to win that victory . . . to plan now the reconversion of our tremendous wealth of resources, skills and machinery to all-out production for a better America!

One of these engineers is a Bryant man. We urge you to call him in today.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

JIGMIL for Faster, Better and more Accurate BORING and Milling Performance





The JIGMIL is a totally new approach to the problems of boring and milling having dependable accuracy and ease of manipulation that eliminates the necessity for specialized skill.

The JIGMIL provides great economies on experimental and tool work.

The JIGMIL does most production boring and milling work faster and more accurately with rugged tools working in the open than is possible with the part trapped inside the walls of a boring fixture.

Two to three times faster than any other method.

Dependable accuracy and better finished holes than any other method.

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

FOR GENERAL PURPOSE PLAIN CYLINDRICAL GRINDING . . . FITCHBURG *shows the way to increase production and cut costs*

6-Inch Type "B"—The Fitchburg Type "B" 6-inch automatic precision grinder features new engineering principles that result in more economical and faster production of plain cylindrical parts. Made with 18" and 32" maximum capacity between centers.

10-Inch Type "B"—The Fitchburg Type "B" 10-inch plain cylindrical automatic precision grinder also incorporates engineering features that result in more economical and increased work production, greater accuracy, and finer finish. Made with 18", 48" and 72" maximum capacity between centers.

Type "C" Adjustable Angular Head Grinder—The Fitchburg Type "C" Angular Head grinding machine is a single application of the Fitchburg Standard Bowgage Wheelhead Unit. It is designed to handle a wide range and a number of types of jobs. The Bowgage Unit is mounted so that it may be located to grind 0 degrees up to a 45-degree included angle. Prompt deliveries can be made. Mail coupon today.

10" TYPE "B" GRINDER

6" TYPE "B" GRINDER

TYPE "C" ANGULAR HEAD GRINDER

Please mail the catalog checked.

6" Type B ☐ 10" Type B ☐ Angular Head ☐

NAME _____ TITLE _____

COMPANY _____

STREET _____ STATE _____

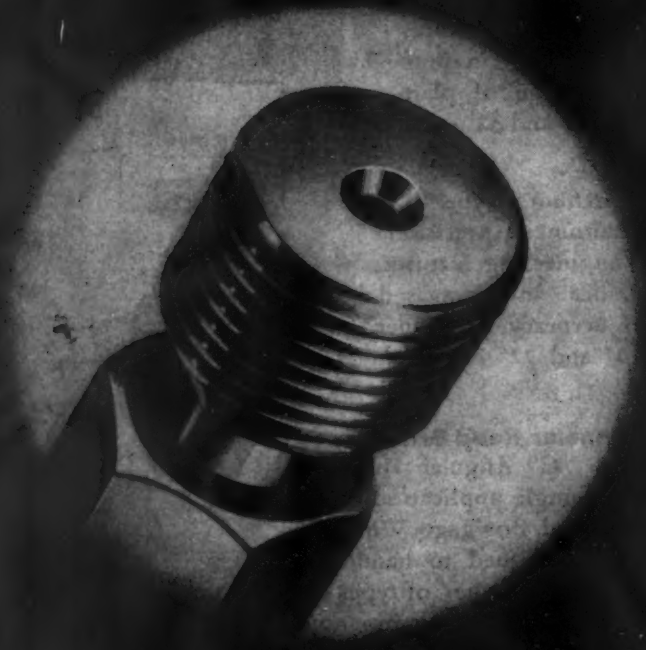
CITY _____ A.M.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

CADILLAC *Stellite* THREAD PLUG GAGES



REDUCE GAGING COSTS 50 *to* 80%

ALL STANDARD SIZES

from No. 5 (.125") to 1.5"
Specials to 15"

CADILLAC *Thread* **GAGES**

IN the inspection of mass production parts, Cadillac STELLITE Gages have demonstrated that they outwear steel gages several times over, reducing gaging costs from 50% to 80%.

Besides having a much greater resistance to abrasion, they also have a much lower coefficient of friction. This cuts down drag on the gage, reduces expansion caused by frictional heat, and thereby overcomes the tendency of the gage to freeze in the part being inspected.

If you have a quantity inspection job that keeps you busy buying steel gages, change over to Cadillac STELLITE Gages. They will reduce your gaging costs to a fraction of what they have been heretofore.

•

Write for Literature!

•

CADILLAC GAGE COMPANY
20316 Hoover Road Detroit 5, Mich.

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

The soybean is now the third largest cash grain crop in the United States.

get ready with CONE for tomorrow

Aluminum can now be chemically bonded to steel so that the two become a completely integrated unit. This process has already contributed greatly to improvement in the horsepower per pound ratio of certain of our aircraft engines.

get ready with CONE for tomorrow

A 200 page book may now be printed on both sides of a 6 x 9 inch sheet and enlarged for reading by the use of a new machine. This would bring the cost of books to about five cents per volume. It is estimated that a full size encyclopedia, printed by this method, would cost about three dollars.

get ready with CONE for tomorrow

One authority states that oil can be produced from American shale in commercial quantities and at a competitive price.

get ready with CONE for tomorrow

Zein, the new shellac substitute derived from corn, is being used in shoe soles and heels, cements, rain coats, mats, gaskets, and rubber stamps. Packaging films, textile fibers, and bottle caps may be expected later.

get ready with CONE for tomorrow

Most radical of all the new power plants is one in which the fuel is burned in gas mantles and the radiant energy produced is converted into electricity by photo-electric cells.

get ready with CONE for tomorrow

Pure iron can now be deposited on non-metallic substances. By this method a surface of iron may be put on a base of rubber, wood, or plastic.

Some of the new paper-resin laminates may now be formed as easily as a cook lines a plate with pie crust, and require pressures as low as 50 lbs. per square inch.

get ready with CONE for tomorrow

Glass fabric impregnated with synthetic resin is a new material with extraordinary properties. Tensile strength may be more than 80,000 lbs. per square inch.

get ready with CONE for tomorrow

Five states have pooled their electrical generating capacity with results equalling the addition of 135,000 horsepower. This practice is expected to spread.

Aerial photography can show whether the soil of a particular area is gravel, sand, silt, or clay.

get ready with CONE for tomorrow

A new lacquer can be baked on to metal surfaces and removed by heating above 212° F.

get ready with CONE for tomorrow

An experimental Diesel engine weighs only eleven ounces per horsepower and can operate on either Diesel oil or gasoline.

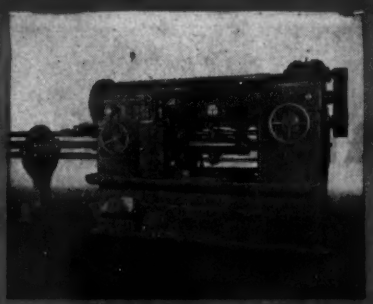
get ready with CONE for tomorrow

A Canadian manufacturer of railroad equipment has designed a flatcar to be used as a landing place for helicopters.

get ready with CONE for tomorrow

The "axonograph" is a device that photographically produces an axonometric drawing directly from a blueprint.

This machine cuts its own weight in metal in four days



3½" 6-Spindle Conomatic

To produce the part shown, 6 pounds of chips — over a sixth of a ton of metal per hour — were removed from WD1314 bar stock.

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

12

Air Conditioning helps this theatre put on GREAT shows!

You watch the Jap take a torpedo amidships.

Your eyes strain to catch every changing scene, every detail, every flicker of motion. You see the Jap flounder . . . and sink. This is a *great* show!

Air conditioning not only helped to make those unforgettable pictures clear and sharp and bright . . . it helped make possible *the hit itself!* Because the optical aiming and viewing system used in the periscope of this U. S. submarine was ground and polished to high standards of precision—in an air conditioned workshop.

Tomorrow's air conditioning is being previewed today in war industries, in stratosphere chambers, in penicillin plants, in military installations—wherever wartime applications demand new and improved equipment. After victory this compact, flexible, efficient equipment will be available for *all* business . . . from G-E.

When the time comes, would you like to be one of the first to get information about postwar G-E Air Conditioning? Write: *General Electric Company, Air Conditioning and Commercial Refrigeration Divisions, Section 449, Bloomfield, N. J.*

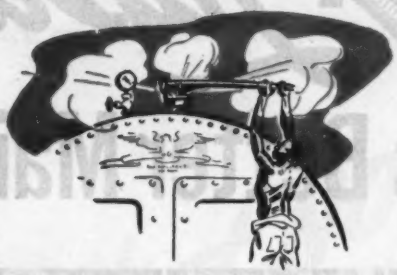
☆ BUY . . . and hold . . . WAR BONDS ☆

Air Conditioning by

GENERAL ELECTRIC

Hear the General Electric Radio Programs: The "G-E ALL-GIRL ORCHESTRA," Sundays, 10 p. m., EWT, NBC . . . "THE WORLD TODAY" News, Every Weekday, 6:45 p.m., EWT, CBS

HOLDING DOWN THE SAFETY-VALVE WAS A DANGEROUS WAY TO GAIN POWER AND SPEED!



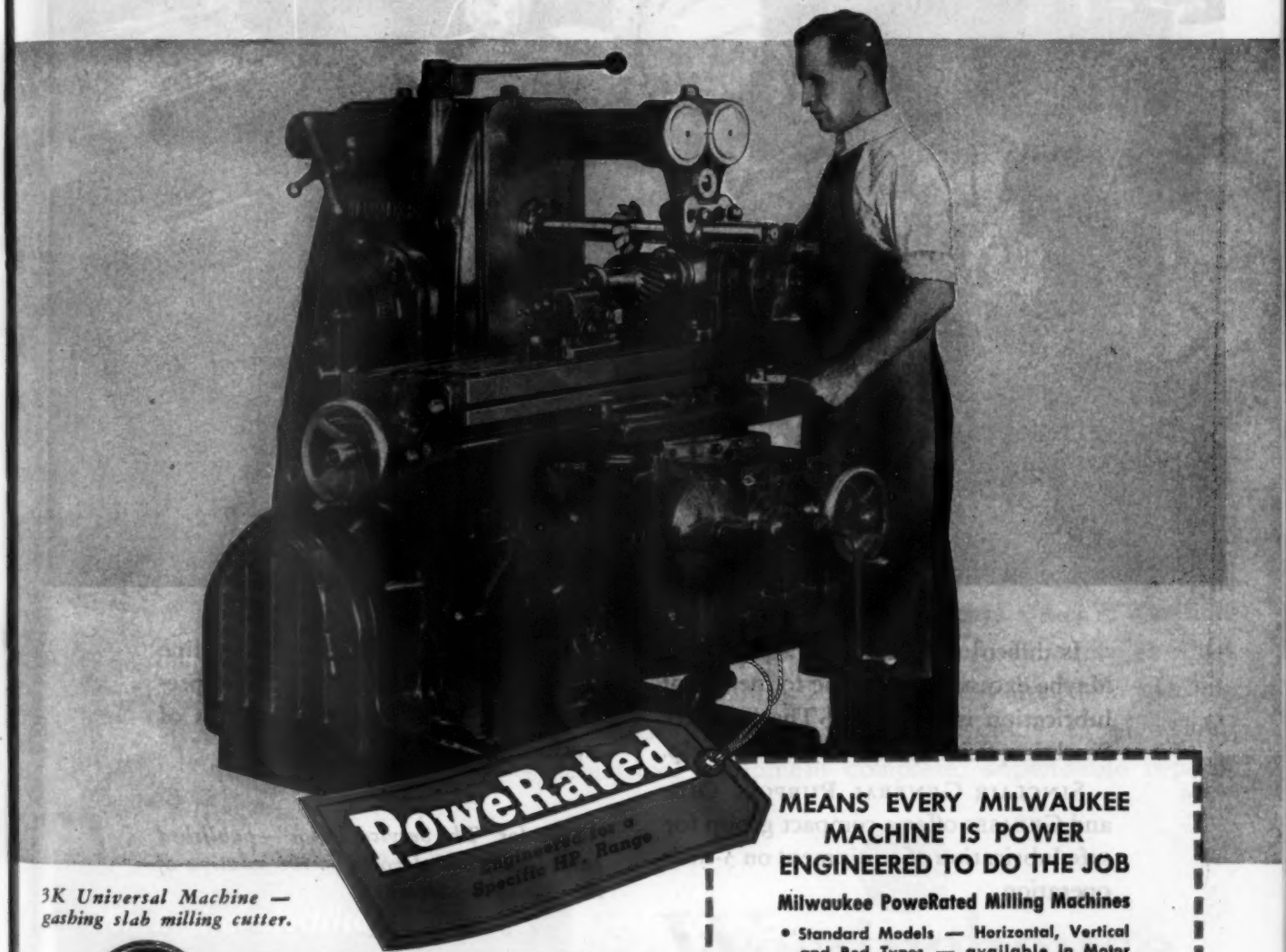
If the old steam-boatin' days when skippers and their craft raced one another on the Mississippi, some of them would resort to having a husky negro deck-hand hold down the safety valve on the boiler — to gain added power and speed. A dangerous practice, of course, that frequently resulted in disaster for skipper, steamboat and crew.

An equally doubtful expedient in machine-tool operation is the practice of substituting a higher hp motor above that normally specified for a particular class of machine. When you buy a milling machine, arbitrarily stepping up the motor hp to gain added power and speed is unsound. The power may be excessive and out of balance with its design, construction and proper range of performance.

It's an undesirable and unnecessary expedient when you know you can get milling machines — power-engineered — amply powered and properly engineered for every class of job.

Designed and built for precision performance with balanced power, Milwaukee Milling Machines are PoweRated—every machine has a definite power rating with ample reserve for all overloads normally encountered within its field of job application. You can always be sure of ample and correct motor power in every power-engineered Milwaukee.

When you are considering the purchase of a milling machine — think in terms of motor hp for heavy cuts, feed and speed range for light cuts. Check all the advantages of Milwaukee PoweRated Machines for your specific needs.



3K Universal Machine — gashing slab milling cutter.

MEANS EVERY MILWAUKEE MACHINE IS POWER ENGINEERED TO DO THE JOB

Milwaukee PoweRated Milling Machines

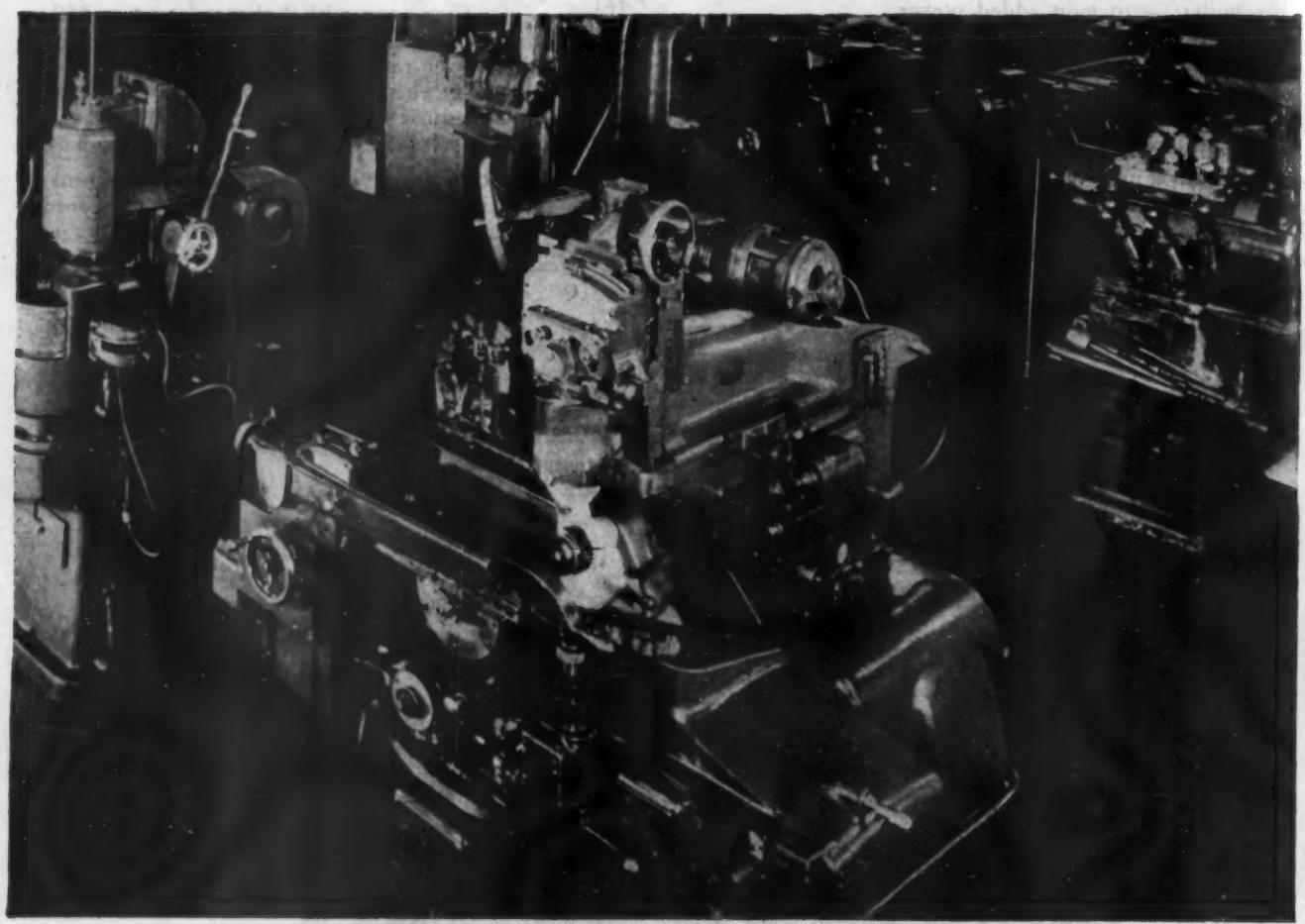
- Standard Models — Horizontal, Vertical and Bed Types — available in Motor ranges from 3 to 25 hp
- C.S.M. (Carbide Steel Milling) machines 20 to 50 hp
- Special Machines—Consult K & T engineers.

KEARNEY & TRECKER CORPORATION

MILWAUKEE 14 WISCONSIN

Milwaukee Machine Tools

BETTER *Lubrication* Means Better Maintenance



Is difficult maintenance a problem? Maybe excessive wear due to inefficient lubrication is the cause. That's where Sinclair specialized lubricants can help.

SINCLAIR GENERAL PURPOSE OILS and GREASES offer a compact group for safe lubrication of equipment on 3-shift operation.

Sinclair also offers a diversified line of cutting oils designed for greater precision and finer finish in all types of machining.

• • •

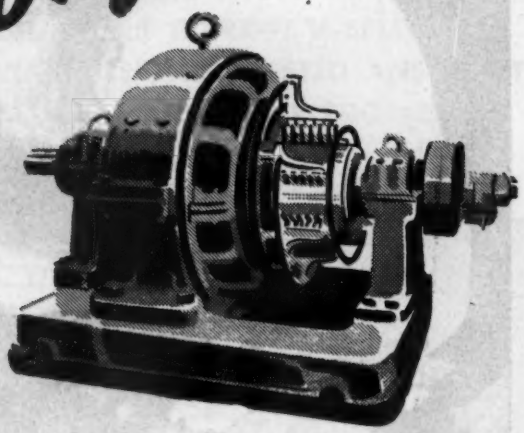
(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Saved from the scrap pile... by wartime necessity ...this wrecked motor was completely rebuilt and back on the production job in short order.

Wrecked-but NOT junked



An open field circuit caused a runaway . . . bearing pedestals snapped . . . stator and armature were wrecked on this steel mill edger drive motor.

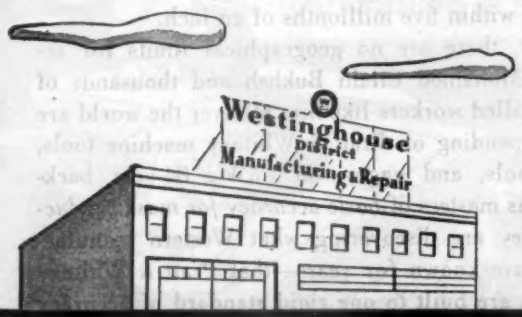
It would take months to get a new 250 hp—230-volt, variable speed—d-c motor. What was to be done?

Instead of scrapping this motor, it was rebuilt in a Westinghouse *Manufacturing and Repair** Plant. To meet the emergency, three shifts worked 24 hours per day—completed the job in 21 days.

To keep production rolling, Westinghouse M & R Plants are called upon for every kind of electrical repair service. Each M & R Plant is a link in a nation-wide chain—with a local service branch as close as your telephone. Factory-trained men, using factory methods and equipment, are ready to give your electrical equipment complete, dependable repairs.

J-90552

TUNE IN JOHN CHARLES THOMAS • SUNDAY 2:30 EWT., N.B.C. • HEAR TED MALONE • MON. WED. FRI., 10:15 EWT., BLUE NETWORK

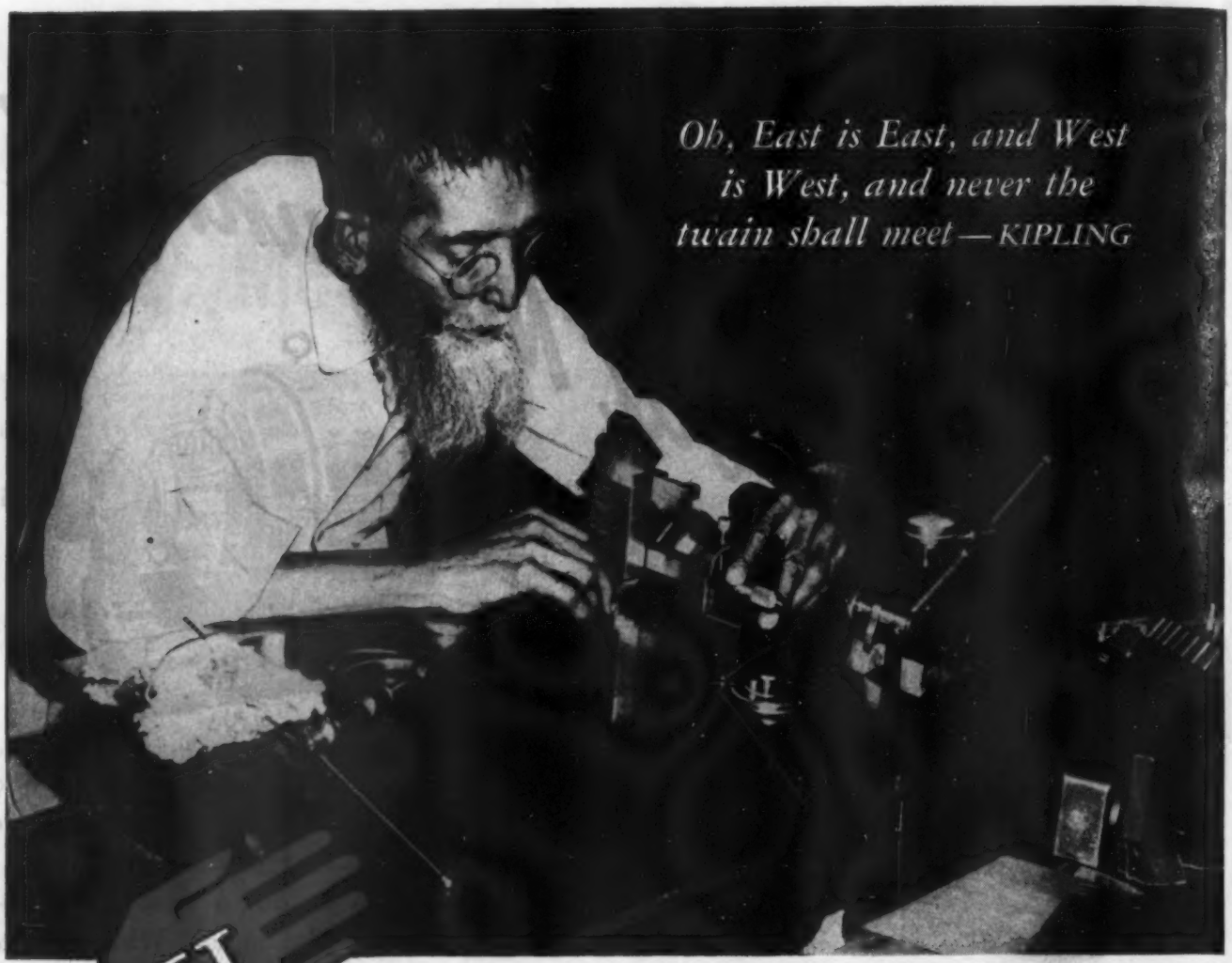


When vital electrical equipment needs repair... phone the nearest office of Westinghouse Electric and Manufacturing Company for

Westinghouse

COMPLETE REPAIR SERVICE

*33 M & R PLANTS • • ONE NEAR YOU



P & W Hoke Blocks bring accuracy to India. . . . OWI Photo

MEET MOHAMED ELLAHI BUKHSH

No, Mr. Kipling, this picture was *not* taken in the modern factory of a Western industrial nation. It is India . . . a new and progressive India which is proving that East and West *can* meet, and get along famously. The workman here is Mohamed Ellahi Bukhsh, 62, an expert with precision tools in a large Indian armament plant . . . one of many such plants equipped with the finest, most up-to-date American machines and tools.

Here, though halfway around the world in a country taking its first industrial "steps," accuracy is not a hit-or-miss proposition. For example, here on the job with Mohamed Bukhsh are the familiar Pratt & Whitney Hoke Precision Gage Blocks, a basic, unchanging standard of measurement guaranteed to be accurate within five millionths of an inch.

Today, there are no geographical limits for accuracy. Mohamed Ellahi Bukhsh and thousands of newly-skilled workers like him all over the world are daily depending on Pratt & Whitney machine tools, small tools, and gages—on P&W's 84-year background as masters of *basic accuracy for mass production*. They are discovering what Western manufacturers have known for years—that Pratt & Whitney products are built to one rigid standard of accuracy which never changes.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

Prepared for ACTION!

YOU'RE SURE TO GET TOP-FLIGHT DRIVE PERFORMANCE WHEN YOU SPECIFY ALLIS-CHALMERS TEXROPE V-BELTS . . . EACH BELT IS DESIGNED, TESTED AND BUILT TO SOLVE SPECIFIC DRIVE PROBLEMS

♪ *Tune in the Boston Symphony, Blue Network, every Sat. Eve.*

REALLY BAD OIL CONDITIONS ARE MY OBJECTIVES. I'M SUPER-7 OIL-PROOF...MADE OF SOLID NEOPRENE. GRIMY LIQUIDS DON'T BOTHER ME.
OIL
SUPER-7 STATIC-RESISTING TALKING: MY BUILT-IN CONDUCTING ELEMENT CARRIES STATIC CHARGES TO MACHINES WHERE THEY'RE GROUNDED.
HEAVY LOADS? EASY! MY STEEL CABLES ADD POWER, REDUCE STRETCH AND SLIPPAGE. I'M SUPER-7-STEEL.
90% OF ALL OIL CONDITIONS ARE A CINCH FOR ME. NEOPRENE IS MY COVER..SUPER-7 OIL-RESISTING, MY NAME.
HOT-RUNNING DRIVES ARE WHERE I SHINE. 180°F IS JUST COMFORTABLY WARM FOR SUPER-7 HEAT RESISTING. THAT'S ME
A 1771

IT PAYS TO MAKE **ALLIS-CHALMERS** YOUR

V-BELT DRIVE HEADQUARTERS

Texrope Super-7 V-Belts result from the cooperative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.

MORFLEX COUPLINGS FOR MANY USES

Without lubrication **Morflex Couplings operate at top efficiency . . .** ***resist shock and vibration*** **because resilient rubber trunnion blocks are assembled under pressure in the center unit. ¶ Dust and dirt can't interrupt their trouble-free performance. ¶ Compact and quiet, designed for dependability on any type of installation. Morflex couplings combine all these features. ¶ Consult your Morse engineer.**

SPROCKETS CHAINS FLEXIBLE COUPLINGS CLUTCHES

MORSE *Roller and Silent* CHAINS

MORSE CHAIN COMPANY • ITHACA, N.Y. • DETROIT 8, MICH. • A BORG-WARNER INDUSTRY

Detroit manufacturer* of aircraft parts increases production 450%

They used to hone one bushing per minute—and then they had to stop and clean out left-over abrasive. Now they finish-ream 4½ bushings per minute, to mirror-smooth finish and close tolerances, in only one operation! The Lempco Expansion Reamer has many time-saving features. Blade segments easily removed and resharpened, or replaced when worn out. Flutes spiral in opposite directions simultaneously, eliminating chatter and producing a perfect finish. Good delivery. *Write for catalog.*

SPECIAL REAMERS DESIGNED

TO MEET YOUR NEEDS

SEND BLUEPRINTS

*** Name on request**

hardened bushings...

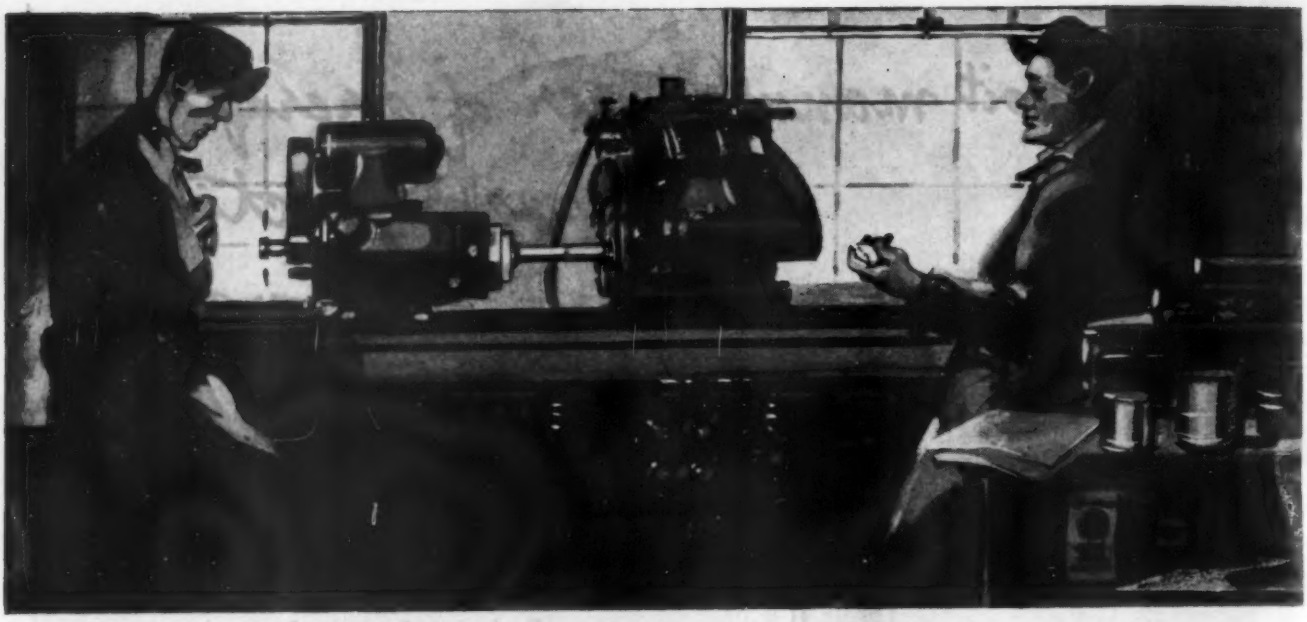
4½ per minute instead of only 1 per minute

SOLD SEPARATELY OR IN BOXED SETS

WRITE FOR FULL DETAILS

LEMPCO

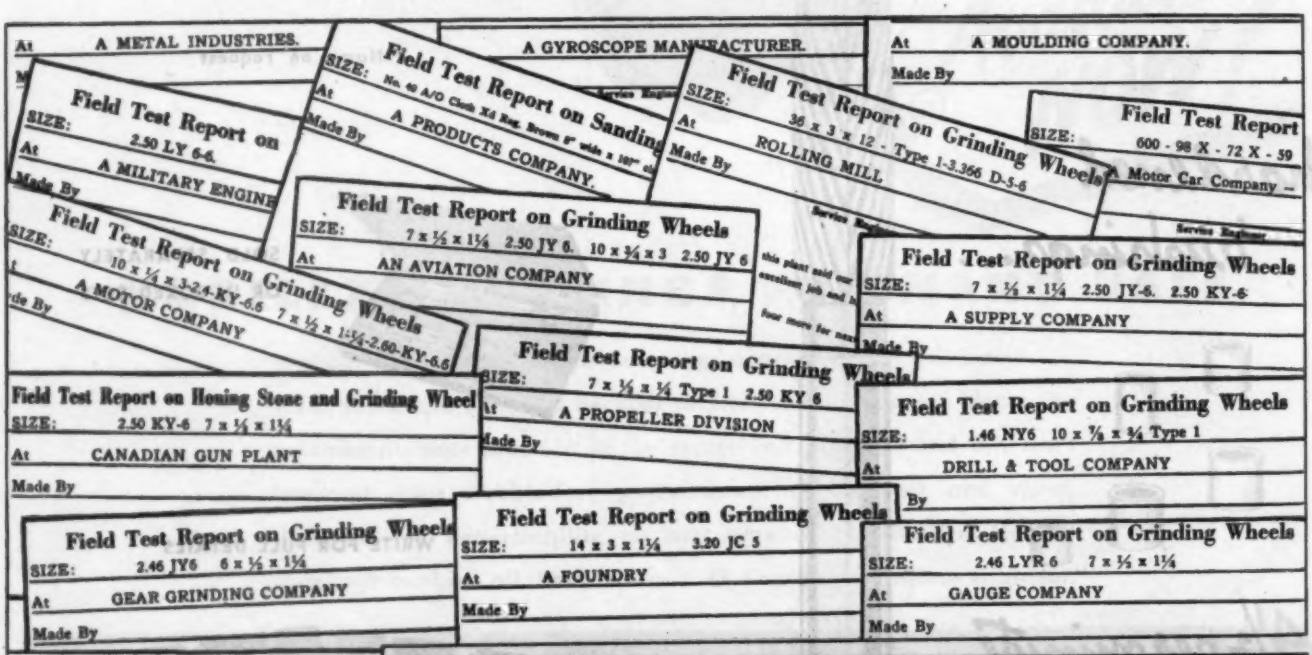
5711 DUNHAM ROAD • BEDFORD, OHIO



A MID-WEST
RECOMMENDATION JUMPED PRODUCTION

A large engine manufacturer was recently facing a serious production slow-down. A MID-WEST service engineer was called in to make a complete study of this manufacturer's operation. His engineering analysis showed a deficiency in the abrasive the firm was using and advised the manufacturer to replace it with a MID-WEST wheel. Result: production was jumped to an amazing extent and the finished product was rounder and straighter because the MID-WEST wheel cut free with little or no pressure.

Illustrated below are a few of MID-WEST ABRASIVE COMPANY'S reports from its service engineers.

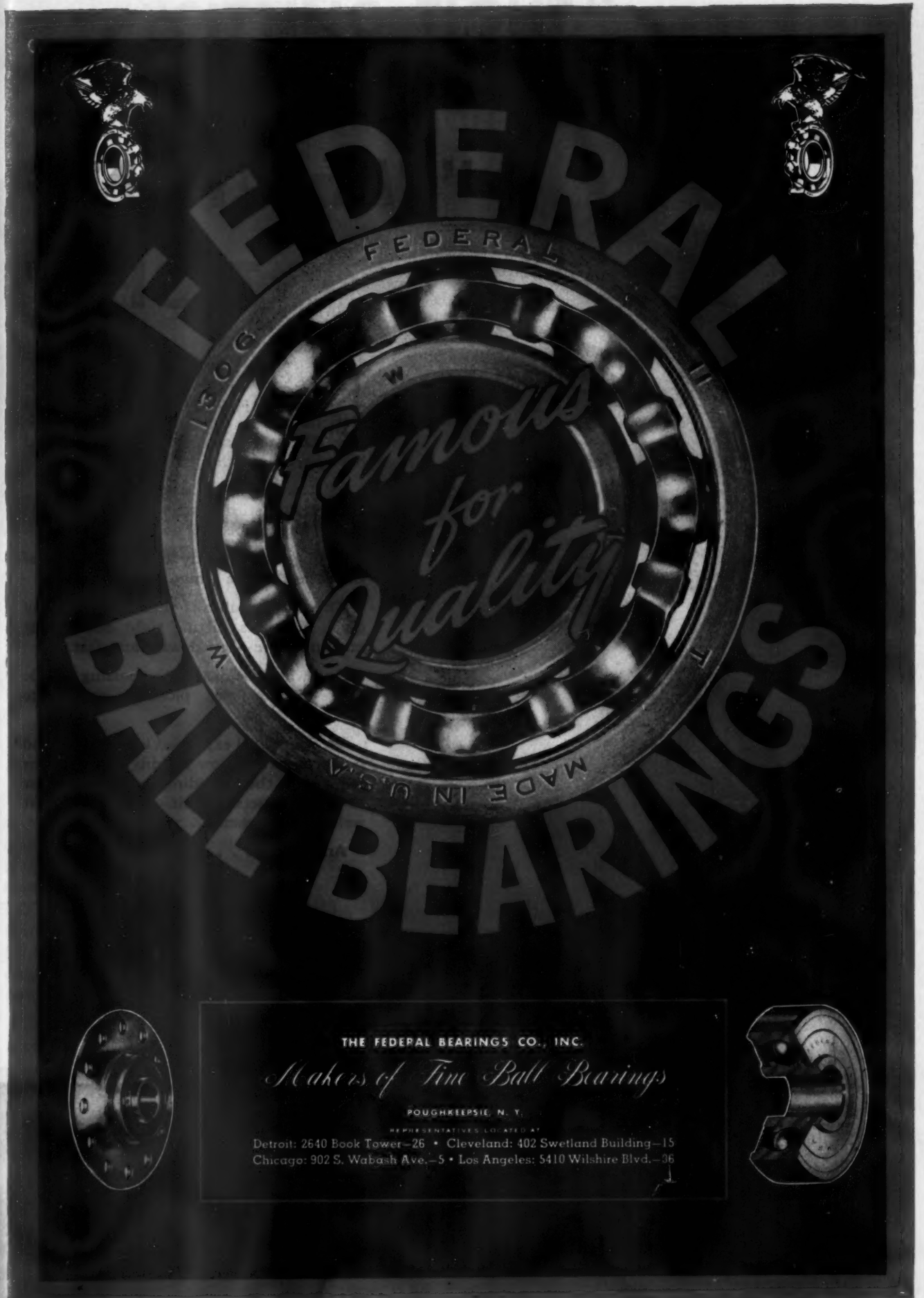

At A METAL INDUSTRIES.
Field Test Report on
SIZE: 2.50 LY 6-6.
At A MILITARY ENGINE
Made By
A GYROSCOPE MANUFACTURER.
Field Test Report on Sanding
SIZE:
At A PRODUCTS COMPANY.
Made By
Field Test Report on Grinding Wheels
SIZE: 36 x 3 x 12 - Type 1-3.366 D-5-6
At ROLLING MILL
Made By
At A MOULDING COMPANY.
Made By
Field Test Report
SIZE: 600 - 98 X - 72 X - 59
A Motor Car Company --
Field Test Report on Grinding Wheels
SIZE: 7 x ½ x 1¼ 2.50 JY 6. 10 x ¾ x 3 2.50 JY 6
At AN AVIATION COMPANY
Field Test Report on Grinding Wheels
SIZE: 10 x ¼ x 3-2.4-KY-6.6 7 x ½ x 1-¼-2.60-KY-6.6
At A MOTOR COMPANY
Field Test Report on Grinding Wheels
SIZE: 7 x ½ x 1¼ 2.50 JY-6. 2.50 KY-6
At A SUPPLY COMPANY
Made By
Field Test Report on Grinding Wheels
SIZE: 7 x ½ x ¼ Type 1 2.50 KY 6
At A PROPELLER DIVISION
Made By
Field Test Report on Honing Stone and Grinding Wheel
SIZE: 2.50 KY-6 7 x ½ x 1¼
At CANADIAN GUN PLANT
Made By
Field Test Report on Grinding Wheels
SIZE: 1.46 NY6 10 x ⅞ x ¾ Type 1
At DRILL & TOOL COMPANY
By
Field Test Report on Grinding Wheels
SIZE: 2.46 JY6 6 x ½ x 1¼
At GEAR GRINDING COMPANY
Made By
Field Test Report on Grinding Wheels
SIZE: 14 x 3 x 1¼ 3.20 JC 5
At A FOUNDRY
Made By
Field Test Report on Grinding Wheels
SIZE: 2.46 LYR 6 7 x ½ x 1¼
At GAUGE COMPANY
Made By

Every MID-WEST item, whether a sandpaper, a grinding wheel, a hone, a rubbing brick, a sharpening stone, compound or wheel dresser, stands on its own record in a family of dependable service-rendering products.

MID-WEST ABRASIVE CO.

Manufacturers of DEPENDABLE Abrasives

Owosso Mich. — 1960 E. Milwaukee Ave. • Detroit 11, Michigan — Rochester Pa.


FEDERAL
FEDERAL
Famous for Quality
MADE IN U.S.A.
BALL BEARINGS
THE FEDERAL BEARINGS CO., INC.
Makers of Fine Ball Bearings
POUGHKEEPSIE, N. Y.
REPRESENTATIVES LOCATED AT
Detroit: 2640 Book Tower—26 • Cleveland: 402 Swetland Building—15
Chicago: 902 S. Wabash Ave.—5 • Los Angeles: 5410 Wilshire Blvd.—36

then he said to himself

"I'M SITTING TIGHT"

REPLYING to America's early proposals and assurances that the United Nations had no designs on Spanish territory, Dictator Francisco Franco defended his neutrality with:

> "I will avoid anything which might disturb our relations in any of their aspects."

Sitting tight in any business is one of the easiest things a man can do.

The only trouble is that in this era of quick advances, sitting tight doesn't get one anywhere—but down—and fast.

And when the dust of the passing parade clears—it's a long, plodding process to catch up.

We see it well expressed in many "Stand-pat" companies now making *no* plans for improving their welding methods—either in new production techniques or the latest welding equipment.

And others. . . .

"SITTING TIGHT," *he says*

Look, Francisco . . . here is the wherewithal to step out in front with Arc Welding:

THE TOOLS FOR NON-STANDPATTERS

"SHIELD-ARC" WELDER

The "Job Selector" of the Lincoln "Shield-Arc" Welder permits selection of the TYPE of welding arc . . . a predetermined welding characteristic . . . to match the job. Its Current Control provides any desired amperage over a wide range. Both selectors are Self-Indicating for KNOWN results . . . unmatched speed, ease and economy of welding. The "Shield-Arc" is recognized the world over for its superiority 32 ways . . . described fully in Bul. 412.

"FLEETWELD" ELECTRODES

These world favorites have been copied extensively as to general appearance and color of coating. To enable you to KNOW that you get the genuine "Fleetweld," they now are marked with 3 GREEN DOTS. Look for this sign of Lincoln Electrodes . . . recognized the world over for their superiority in quality and economy. Complete details and welding procedures in the "Weldirectory," Bul. 402.

THE LINCOLN ELECTRIC COMPANY • CLEVELAND 1, OHIO

America's greatest natural **recourse**

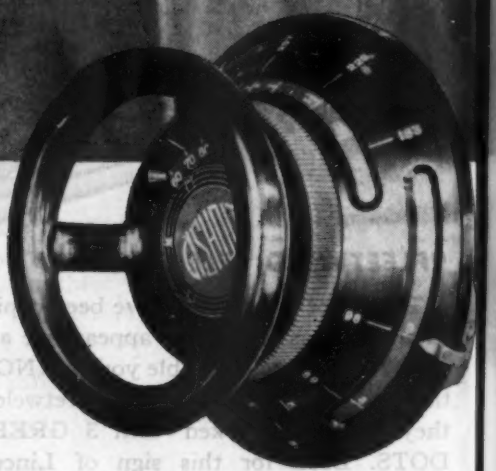
ARC WELDING

"Like an Automatic Gear Shift—"

IN SUBSTANCE, that's what it is! Like an automatic gear shift on your car, it saves time and trouble in traffic. But here, instead of three or four speeds, you have twelve speeds—in both forward and reverse. So it's even *more* important.

Once the job is set up and machining speeds determined, you have merely to turn the dial to the next stop, press a button and the machine responds with the correct R.P.M. speed for each cut. You needn't go through a series of shifts for the speed you want. Gear shifting is automatic. No time out for figuring each change. The machine doesn't make mistakes to cause rejects. And power operation reduces the fatigue factor to a minimum.

This is the kind of machining you can look forward to with the new Gisholt Speed Selector. It's one of many Gisholt improvements that quicken production and cut machining costs to the bone. Get all the facts about it.



THE GISHOLT SPEED SELECTOR is power-operated. Spindle speed changes are made without stopping the spindle or releasing the main drive clutch. The speed selector can be used in two ways, as follows:

DIRECT—By simply turning the control wheel the operator obtains any desired spindle speed without intermediate stops.

PRE-SET—Speed is selected in advance of actual change. On finishing cut, operator presses a trip; speed change is automatic.

In either case when dial is set for any of the six high speeds, a touch to the trip produces a corresponding low speed for threading or reaming.

GISHOLT MACHINE COMPANY
1201 East Washington Ave. • Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . . With Gisholt Improvements in Metal Turning

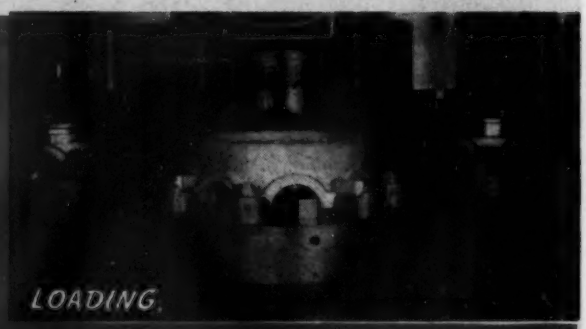
GISHOLT

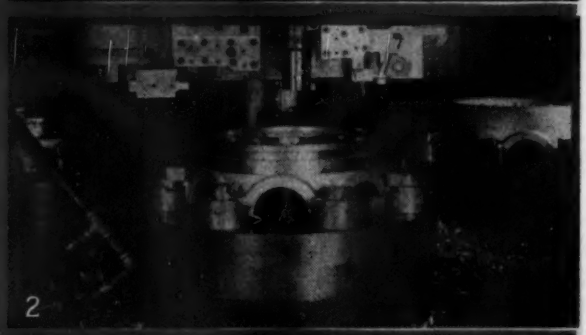
TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

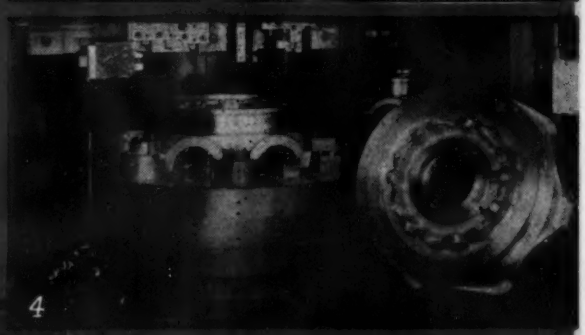
HEAVIER
MULT-AU-MATICS

FOR LARGER AND HEAVIER WORK

NOW, Mult-Au-Matic volume, low cost production on heavier classes of work—these jobs as large as 34" diameter with heights up to 23". This machine will perform Herculean tasks with ease, speed and maintained accuracy. Today's tooling can be easily changed to meet tomorrow's needs.







WRITE FOR ESTIMATES ON YOUR WORK

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT, U.S.A.

LOAD . . then push

CROSS

New York • Chicago • DETROIT • Cleveland • Dayton

a button

20 CYLINDER BLOCKS MILLED AUTOMATICALLY EVERY HOUR

Eight surfaces on two sides of a cylinder block are finished automatically with this Cross Special Milling Machine.

The work is loaded and clamped and the automatic operating cycle is started with an electric push-button centralized at the attendant's station. A cutter on one side of the cylinder block mills the manifold and valve cover faces. After the work progresses to a pre-determined position, the multiple cutter head advances transversely into cutting location on the opposite side. As the work-table continues in feed, the multiple cutter finish 2 angular and 5 straight bosses in planes and then automatic rapid traverse autom to the unl

automatic operation and in most instances perform two or more turning, milling, tapping, reaming or grinding actions either simultaneously or in continuous performance *at the push of a button.*

Post-war production faces a price problem. Cross Special Machinery will preserve your profit in the face of reduced prices by combining a multiplicity of operations in a single automatic machine that eliminates work handling and the need f

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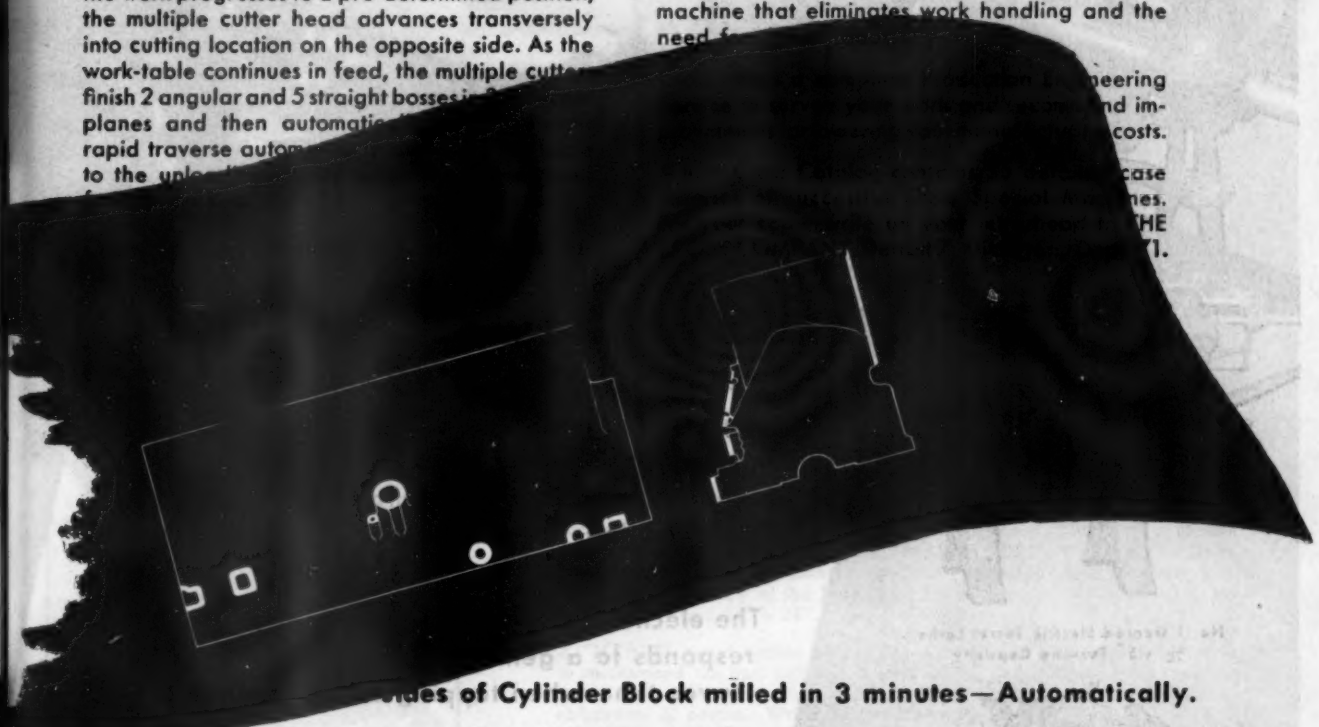


ides of Cylinder Block milled in 3 minutes—Automatically.

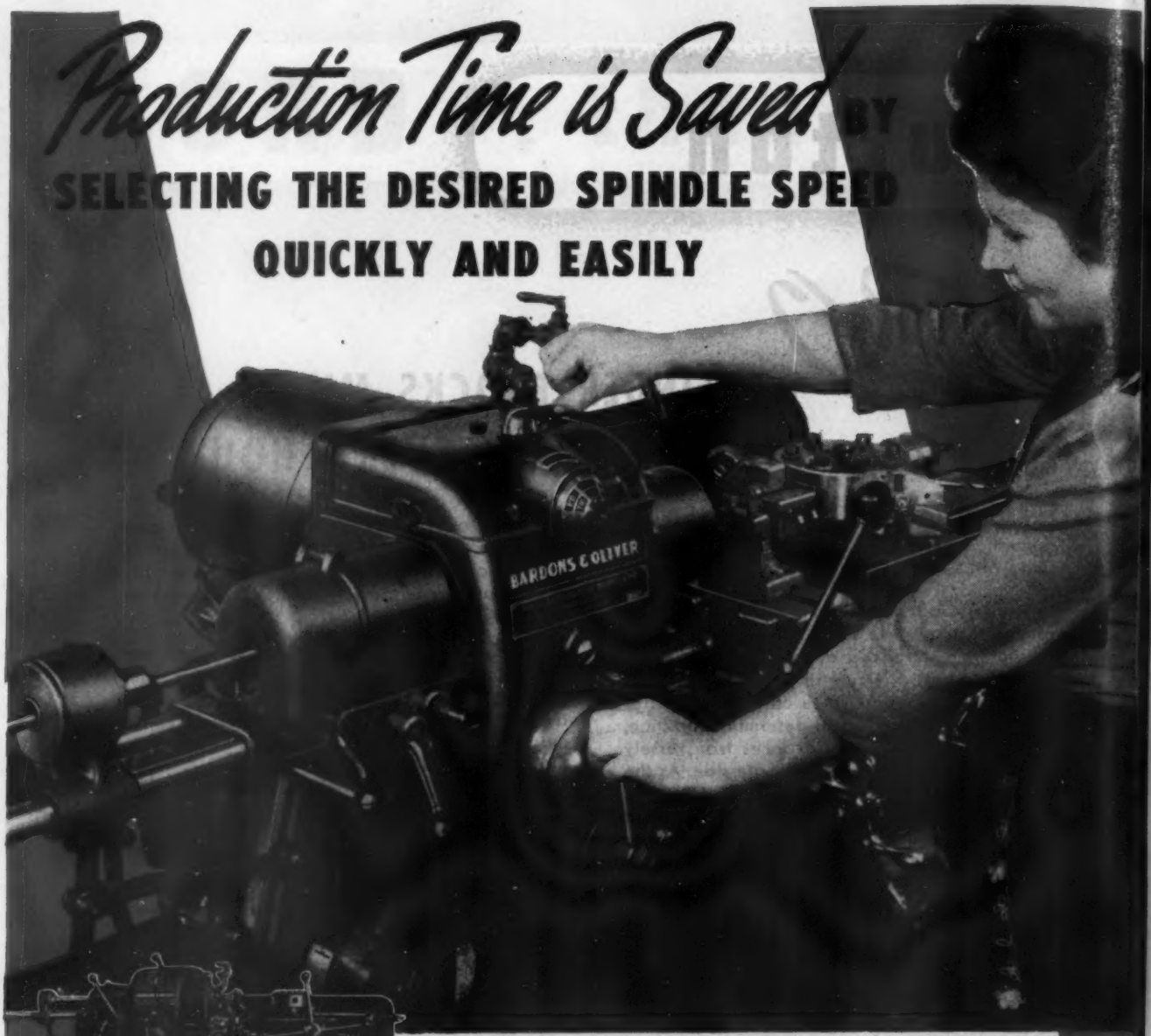
S-14

SPECIAL MACHINES

for automatically performing any one or a combination of metal cutting operations
TURNING · MILLING · DRILLING · BORING · REAMING · TAPPING · GRINDING

Production Time is Saved

SELECTING THE DESIRED SPINDLE SPEED QUICKLY AND EASILY



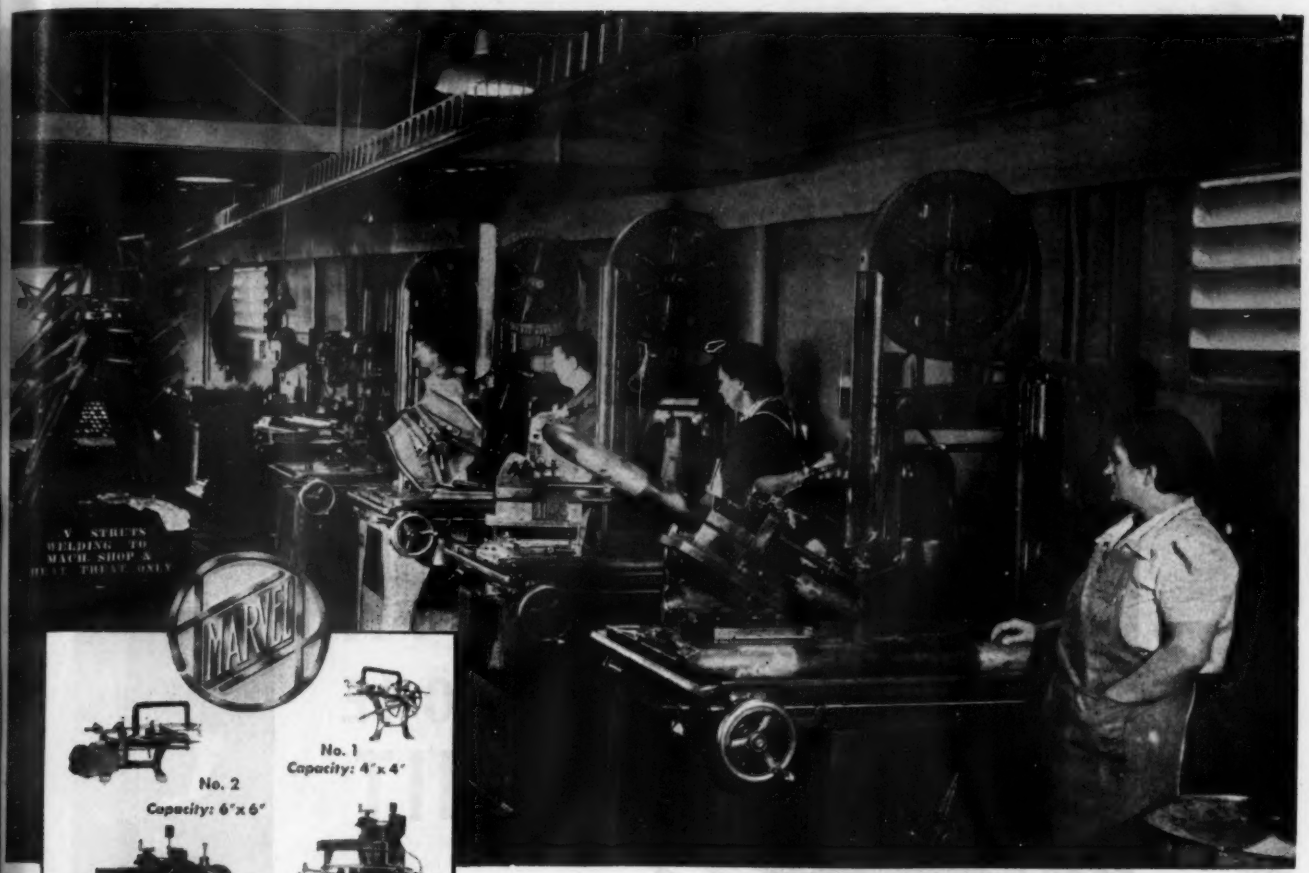
Of the twelve speed changes six are obtainable through sliding gears controlled by a single lever. The short lever by the left hand gives an instantaneous high and a low motor speed change. A direct reading dial automatically indicates the spindle speed.

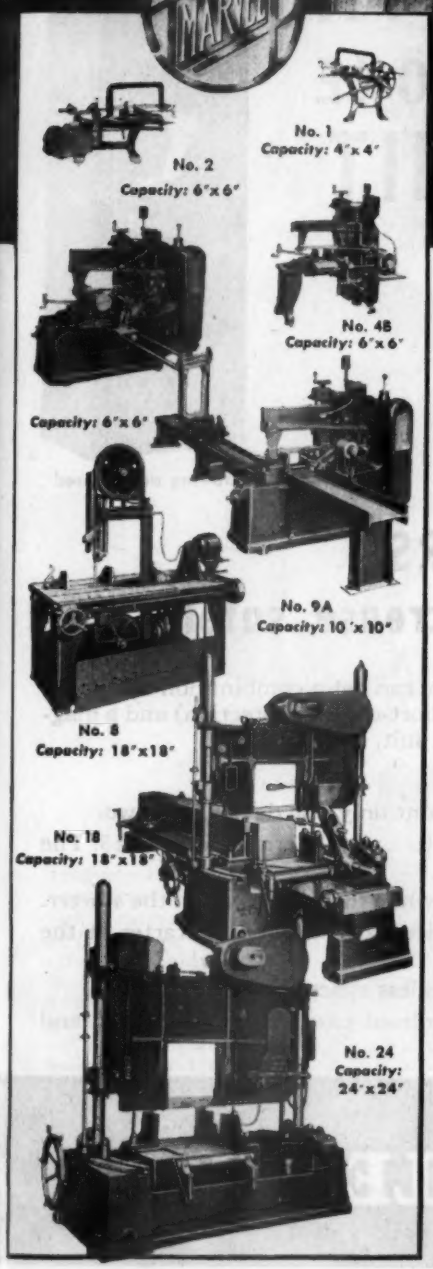
The electrical reverse is exceptionally snappy and responds to a gentle pressure on the lever ball. It saves time when tapping and threading.

Bardons & Oliver Geared Electric Turret Lathes are fast producers of small parts from bars, forgings and castings.

We will gladly furnish complete descriptive matter on request.

BARDONS & OLIVER, INC.
1133 WEST 9TH STREET • CLEVELAND 13, OHIO





MAKE ANGULAR CUTS ON AWKWARD WELDMENTS EASILY

Illustrated are six of the 13 MARVEL No. 8 Universal Metal Cutting Band Sawing Machines in the plant of the National Supply Company in Torrance, California. They are operated entirely by women, cutting tubing at various angles for airplane struts. The National Supply Company selected the No. 8 MARVEL Band Sawing Machines for this work because no other equipment is available to cut these airplane struts with ease, accuracy and economy. They are also using this saw in their tool room, for no matter how small and delicate or heavy and clumsy the job, the MARVEL No. 8 Band Saw will handle it with equal ease.

For production cutting of bar stock up to 10" x 10", they are using three No. 9A MARVEL Saws; which automatically measure, cut and feed up bars up to 10" diameter into accurate, equal lengths, similar to a screw machine, without the attention of an operator.

For real big sawing work, such as shipshaft, breech blocks of guns and other heavy forgings, three No. 18 MARVEL Universal Roll Stroke Hack Saws are used. These giant saws have made possible the economy, speed and efficiency of the Hack Saw Method on cutting large work up to 18" x 18" and 24" x 24".

A "MARVEL metal cutting specialist" is available to survey your work, to recommend the best solution to your cut-off problem and to furnish accurate cost and production data on your work. All without cost or obligation, of course. Write for full information.

ARMSTRONG-BLUM MFG. CO.

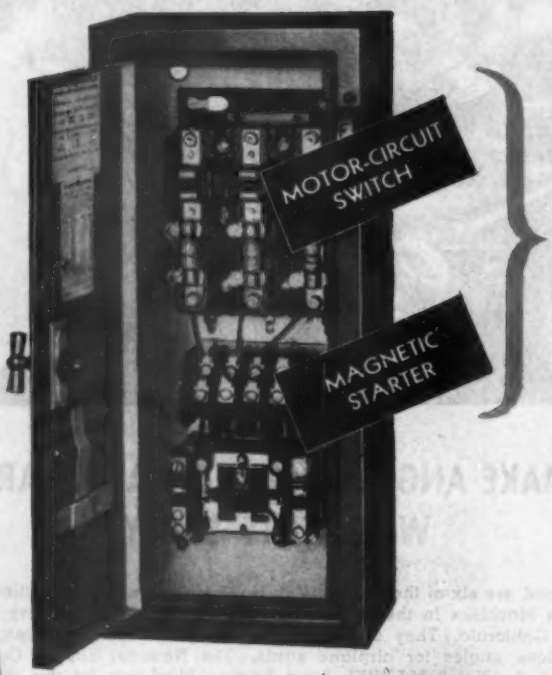
"The Hack Saw People"

5700 W. BLOOMINGDALE AVE. CHICAGO 39, U.S.A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

MOTOR STARTERS



BOTH IN ONE UNIT

Showing door closed

USE COMBINATION STARTERS
to save time, save space, increase safety

Whatever your plant's operating conditions, you can get a combination control to fit it. This means a motor-circuit switch (with short-circuit protection) and a magnetic starter—in one, compact, easy-to-mount unit.

Here are some of the advantages

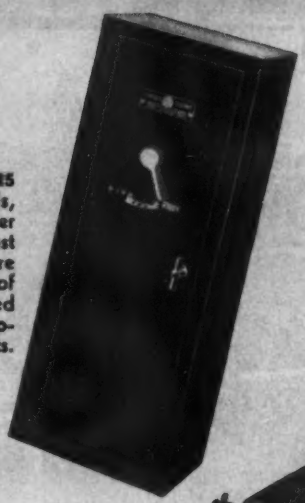
1. *50% reduction in mounting time*—You mount only one device, not two.
2. *40% reduction in wiring time*—Connect to only 9 terminals, not 15. The switch and starter come already connected.
3. *Increased safety*—Cover cannot be opened while there is power on the starter.
4. *Reliable motor protection*—Protection devices co-ordinated in starter at the factory.
5. *Saving of wall space*—The one device takes less space than two.
6. *Improved plant appearance*—Single, streamlined case—less open wiring and conduit.

GENERAL ELECTRIC

EVERY TYPE, EVERY KIND, FOR EVERY MACHINE APPLICATION

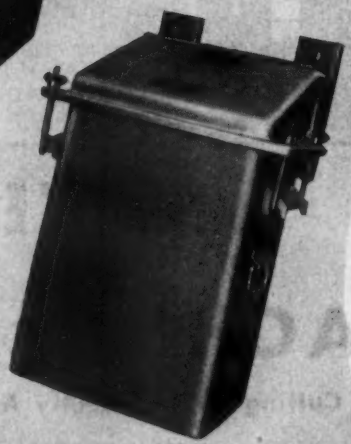
DEPENDABLE... ATTRACTIVE IN APPEARANCE... DESIGNED TO BLEND WITH MODERN MACHINES

DUST-TIGHT ENCLOSURES—For use in steel mills, cement mills, and other locations where the dust content of the atmosphere is heavy. The case is of heavy sheet metal, equipped with heavy gaskets, clamping bolts, and wing nuts.



GENERAL-PURPOSE STARTERS—Suitable for general-purpose, indoor applications where atmospheric conditions are normal.

WATERTIGHT ENCLOSURES—Suitable for outdoor use, and for damp places indoors, such as dairies, breweries, and ship docks. The case is of cast iron, or fabricated steel plate, with a special weatherproof finish and corrosion-proof fittings.



CORROSION-RESISTANT CONTROLLERS—Made in two forms—one for corrosive atmosphere and one for hazardous locations. All arcing parts and terminals (of forms for hazardous locations) are at least six inches under oil.

STARTERS FOR HAZARDOUS LOCATIONS—Made of cast, high-strength alloy. This starter is designed to withstand internal explosions. The flanges, which are securely bolted on all sides, are ground to tolerances which will not permit the escape of gases. General Electric Company, Schenectady 5, N. Y.

Which of these bulletins may we send you?

General Electric Company, Section E676-132, Schenectady 5, New York.

Please send me the bulletins checked below.

- ☐ GEA-3715 General-purpose, dust-tight and watertight starters
- ☐ GEA-3541 Corrosion-resistant controllers
- ☐ GEA-3804 Starters for hazardous locations

Name.....

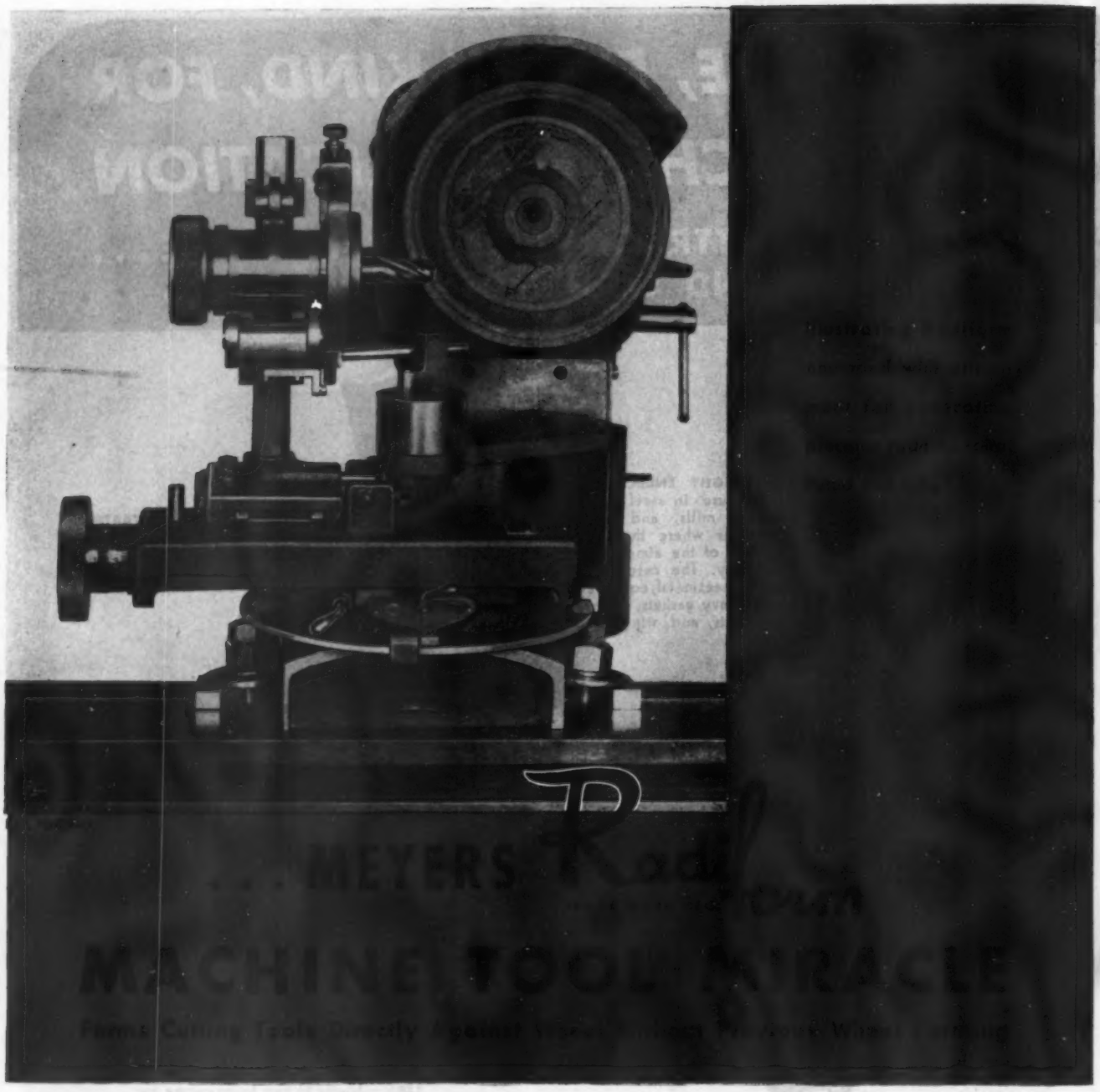
Company.....

Address.....

City.....State.....

8920

Buy all the BONDS you can—and *keep all you buy*



Eliminating the necessity for previous wheel forming, Meyers "RADIFORM" provides a new, practical in-your-shop method for forming various types of cutting tools.

With proper attachments, "RADIFORM" handles the most intricate tool forming operations, including precision forms on spiral fluted end mills and drills; any desired radii and clearance angles on all types of high speed steel and carbide inserted cutting tools.

Because of its versatility, accuracy and simplicity of operation, "RADIFORM" is rapidly being adopted as standard equipment in leading machine shops and manufacturing plants—saving countless man-hours, reducing costs.

Discover what "RADIFORM"—"The Machine Tool Miracle"—can do for you. Send for literature and prices.

W. F. MEYERS COMPANY, INC. • *Established 1888*
1022 FOURTEENTH STREET • BEDFORD, INDIANA

CLIP AND

MAIL THIS COUPON TODAY!

Producing a Mirror Finish on two Corrugating Rolls with a

GRAY PLANER

● It took the rigidity and accuracy of the Gray Planer plus experience and "know how" to produce the mirror finish and maintain accurate contour of corrugations for this work.

52 corrugations were cut in each of two rolls in 1040 Steel. A special form tool of high speed steel was developed for the job and linseed oil provided the coolant. A dividing head was used for indexing the work.

This is only one of a host of jobs that are being run daily on Gray Planers — meeting tolerances and finish requirements absolutely.

★

FOR COMPLETE MECHANICAL DETAILS

write for a Gray Planer bulletin. No obligation.

★

THE G. A. GRAY COMPANY

Cincinnati 7, Ohio, U. S. A.

THE GRAY LINE — Double Housing and Openside Planers, Switch Planers, Die Block Planers, Double-Housing and Openside Milling Planers, Planer Type Milling Machines, Horizontal Boring Machines

"Put it on the Blanchard"

Get These Advantages

- Production ✓
- Adaptability
- Fixture Saving ✓
- Operation Saving
- Material Saving
- Fine Finish
- Flatness
- Close Limits ✓

.50 cal. Side Plates on No. 18 — 36" Chuck

These alloy steel plates are ground in three operations, first removing .015" stock from each side and then finish grinding the first side, removing .010" stock, to limits of ± .00075".

The 36" chuck affords ample area for chucking such rectangular pieces, about 2 feet long. The outer chuck ring is used to retain the pieces on the chuck and their area and thickness are such that no other blocking is needed.

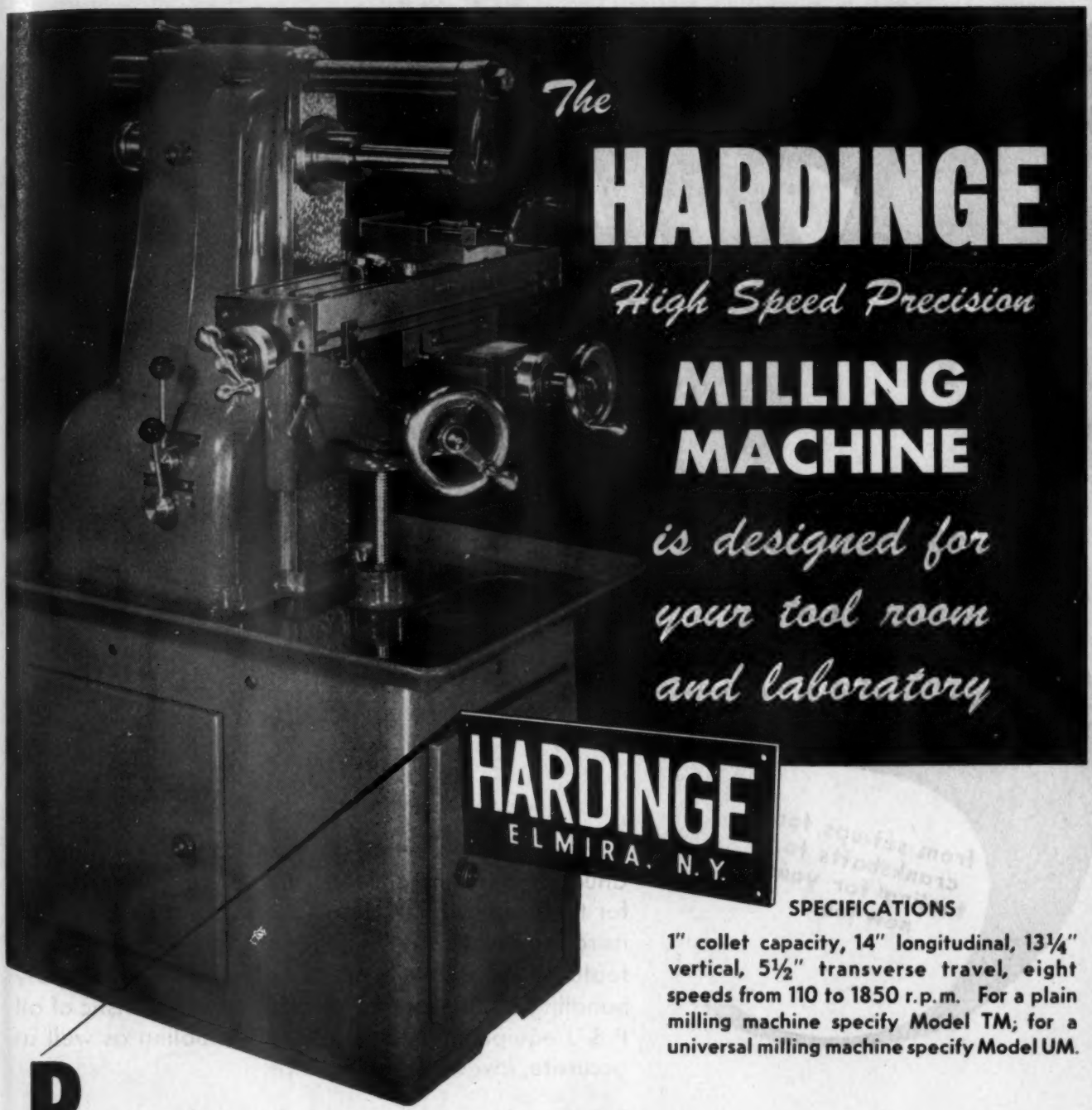
Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

This job being done on the No. 18 Blanchard Surface Grinder

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.



The

HARDINGE

High Speed Precision

MILLING MACHINE

is designed for your tool room and laboratory

SPECIFICATIONS

1" collet capacity, 14" longitudinal, 13¼" vertical, 5½" transverse travel, eight speeds from 110 to 1850 r.p.m. For a plain milling machine specify Model TM; for a universal milling machine specify Model UM.

Precision tool room milling is profitable on this milling machine, designed to meet a definite need in the tool room and laboratory. The precision construction, along modern lines, combines ruggedness with extreme accuracy for ease of operation. Investment and time cost will indicate that larger milling machines are extremely expensive and awkward for many tool room and laboratory milling operations.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

P & J EQUIPMENT

from set-ups for crankshafts to tooling for your new jobs

This interesting set up on a 6 DREL P & J Automatic Chucking Machine on war work can be changed over for the production of post-war parts that come within its range and power. All the convenience and control features which have contributed to fast work and easy handling in the past and which are characteristic of all P & J equipment are retained in retooling as well as accurate, low cost performance.

P & J engineers are prepared to study your requirements in anticipation of your return to civilian products manufacture with the idea of obtaining maximum production from your P & J machines by re-tooling them to handle the new work. Send us specifications or drawings of the parts you have in mind and ask for our recommendations.

P & J Rebuilding Service

Your present P & J Automatics probably have a lot more useful and profitable service in them which can be reclaimed and utilized to advantage by rebuilding these machines in our shop to original accuracy and performance. Investigate our facilities. Retooling can also be conveniently handled at the time of rebuilding.

The POTTER & JOHNSTON MACHINE CO.
Pawtucket, R. I.

REGARDLESS OF THE SIZE OF YOUR SHEET METAL PARTS...Draw them hydraulically WITH H·P·M FASTRAVERSE PRESSES

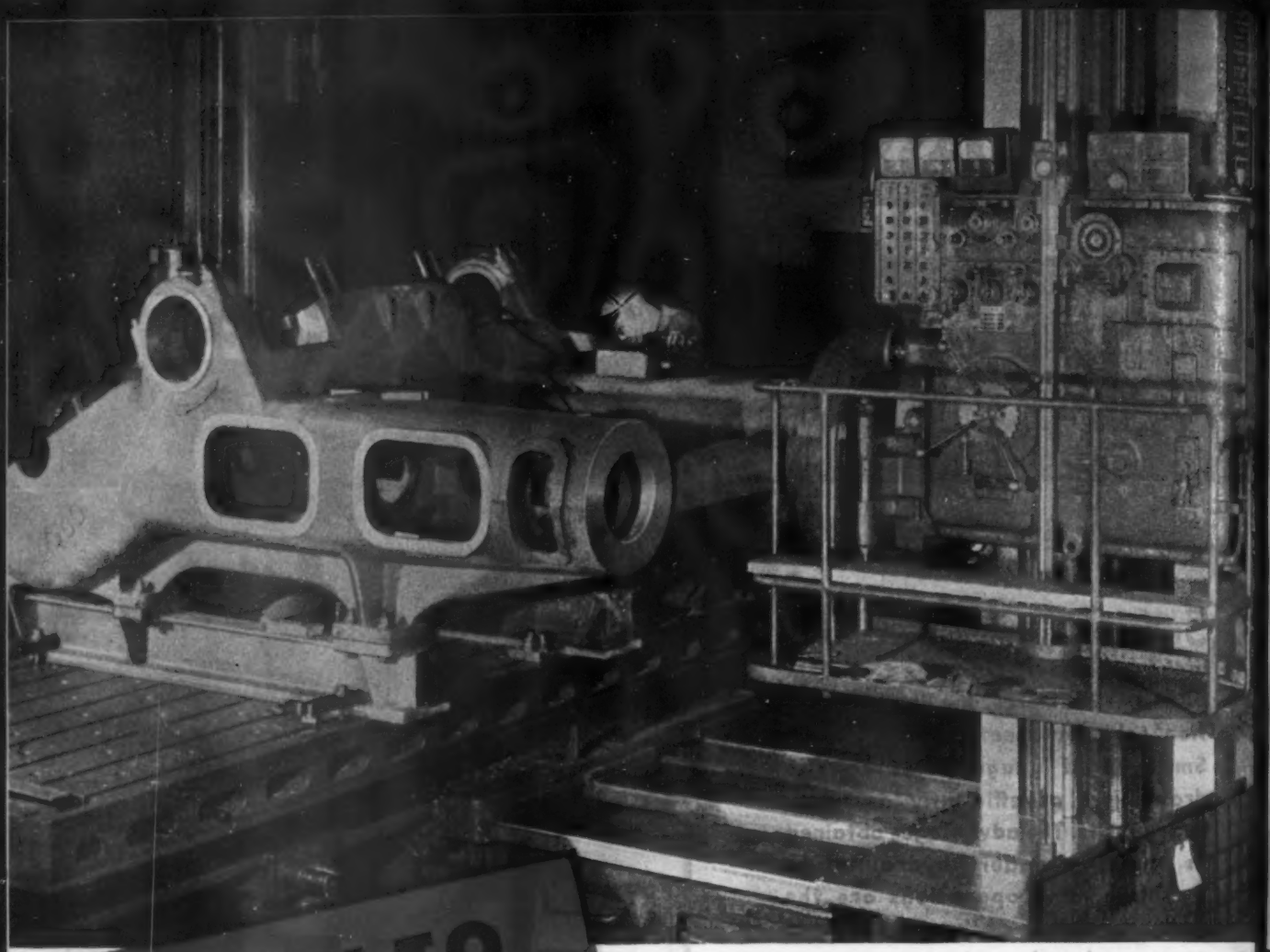
SPEED, flexibility and versatility make the self-contained H-P-M FASTRAVERSE press the ideal production tool for sheet metal drawing. Small, light gauge parts can be drawn just as efficiently as large, heavy parts. The advantages obtained in applying modern hydraulics to metal forming operations are the same, regardless of the size of H-P-M press employed.

The total elimination of wrinkling and tearing saves both stock and production time. There is no distortion or "spring back" after the part is released from the die.

Deeper draws (far greater than can be made with crank or cam driven presses), less rejects, fewer operations, faster production and less maintenance are the natural results of applying modern H-P-M hydraulics to sheet metal forming work. Investigate the possibilities of lowering your metal working costs with H-P-M FASTRAVERSE presses. Write today, stating your requirements.

HPM

THE HYDRAULIC PRESS MFG. CO.
Mount Gilead, Ohio, U. S. A.
Branch Offices: New York, Philadelphia, Cleveland, Detroit and Chicago. Representatives in principal cities.



Pump body mounted on parallels and clamped to machine table. Note remote control pendent which enables operator to watch internal boring operations.

HOW TO ELIMINATE LAYOUT WORK

and complete all operations on one machine

G. & L. Scales and Verniers Locate All Dimensions . . . Milling, Boring, Drilling and Tapping are Performed in Five Simple Settings

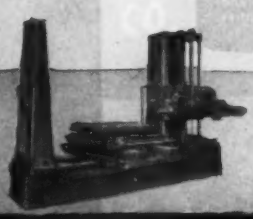
It is usual practice to depend upon G. & L. machines with scales and verniers to hold dimensions to .002″ on general work. This means that work can be taken directly to the machine without first laying out surfaces to be milled, holes to be drilled and center distances to be maintained.

On this pump frame, the following dimensions were held without layout—pinion to crank 35.250/35.248 — cross head to cross head 39.000 plus or minus .002 —

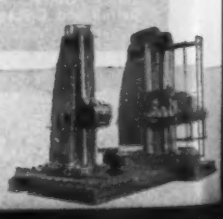
GIDDINGS & LEWIS

138 DOTY STREET

Right: G. & L. Table Type Machine.



Right: G. & L. Floor Type Machine.

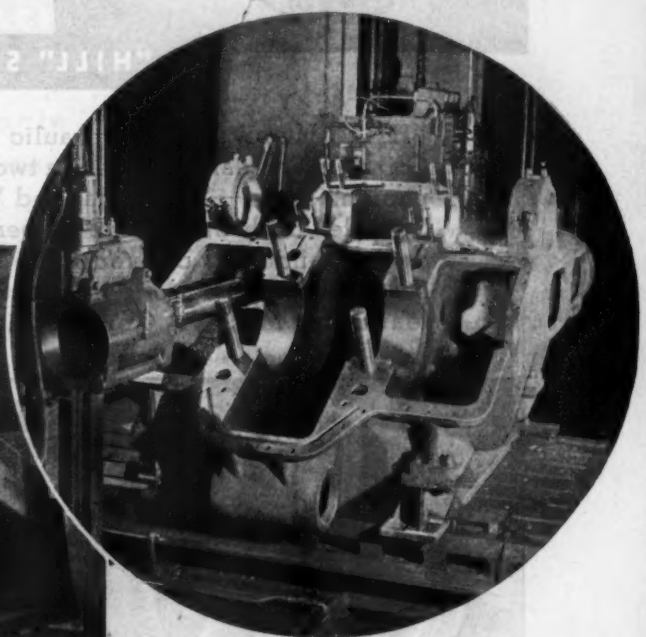


crank bore 19.748/19.746—pinion two bores 12.123/12.121 and 13.998/13.996—cross head bores 17.000 plus .002 minus .000. The scales and verniers regularly furnished with the machine were depended upon entirely to align all bores, drill all holes and mill all surfaces.

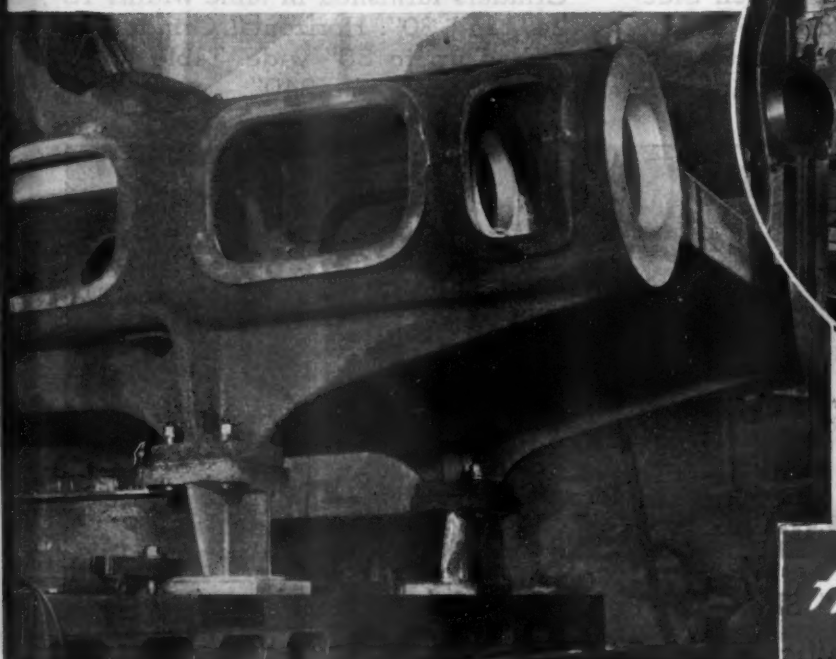
This is a typical example showing how a G. & L. Horizontal Boring, Drilling and Milling Machine is used to completely machine a workpiece. From the time the pump body feet were machined to the time the part was completed, it did not leave the horizontal boring mill. All milling, facing, boring, drilling, tapping recessing, back-facing and counterboring was done on one machine. It was necessary, of course, to change the position of the work in order to perform successive operations. The entire assembly was manually indexed with stop blocks and pins against parallels.

A Continuous Feed Facing Head was used to face and back-face the cross head ends. A remote control pendent enables the operator to leave his position on the operating platform and control the machine as he watches the operation at the cutting tool.

If you are spending valuable man hours in laying out similar work in your own plant, it is possible the G. & L. Horizontal Boring Mill can eliminate this costly operation for you. Our engineers will be glad to study your machining problem and advise where savings can be made. There is no obligation for this service.



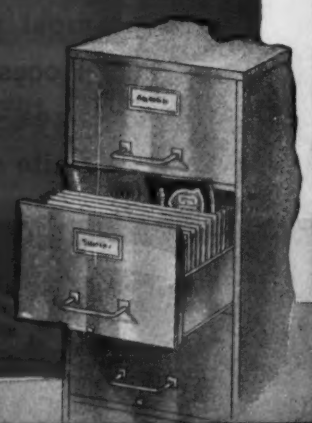
View of pump body showing boring bar extending through cross head bore. Angular cover surface, bolt holes and pinion and crank bearings have been machined.



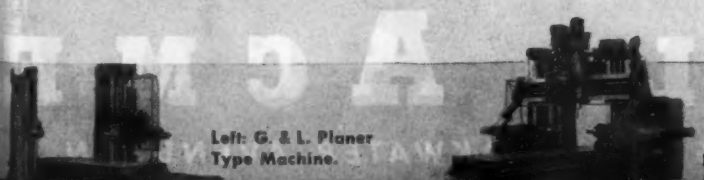
Pump body showing the cross head after boring, facing and back-facing have been completed on one side.

Additional Data

. . . covering the complete line of Giddings & Lewis machines and time-saving accessories is included in this catalog. Write for your copy today—please indicate your business connection. Ask for Bulletin AM-114.



MACHINE TOOL CO.
FOND DU LAC, WIS.



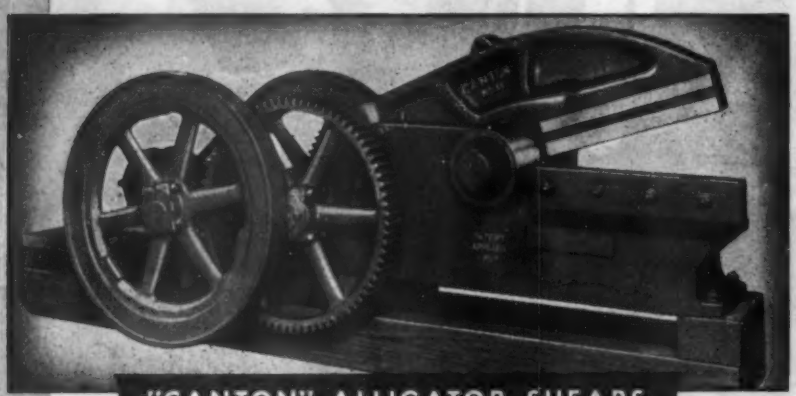
Left: G. & L. Planer Type Machine.

Left: G. & L. Multiple

HILL TOOLS FOR

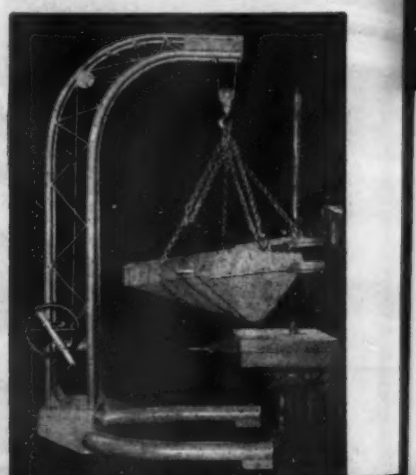
"HILL" SURFACE GRINDERS

"HILL" Heavy Duty Hydraulic Surface Grinders are manufactured in two "Companion" types—Horizontal and Vertical Spindle. Both styles are *"Open Side"* design, affording convenience and accessibility to the work in process, and featuring Massive Construction . . . 100% Hydraulic Table Drive—Built-in Spindle Motor—Centralized Controls—and Permanent Accuracy. Vertical Grinders furnished in table widths 18", 24", and 30". Horizontal Grinders furnished up to 36" wide. Table lengths range from 60" to 240".



"CANTON" ALLIGATOR SHEARS

For years the "Canton" Shear has been the most practical and efficient machine for processing industrial scrap. Available in all sizes,—Right or Left Hand,—High or Low Knife design.



"CANTON" PORTABLE CRANES

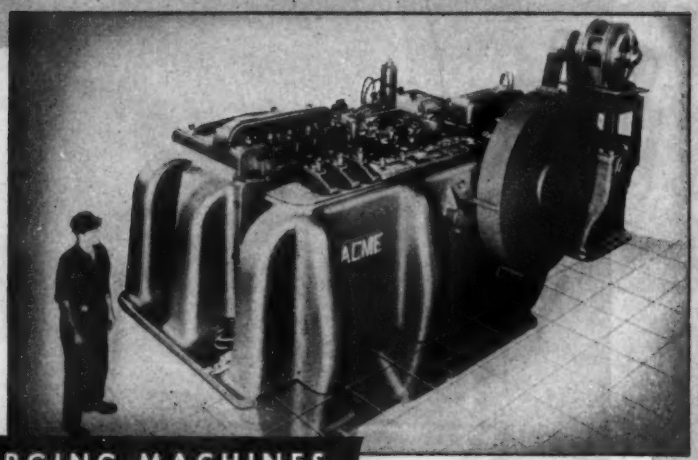
Fabricated Steel Portable Floor Cranes of modern design. The handiest tool in the Shop. Made in eight sizes, one to three ton capacity.

The HILL ACME C

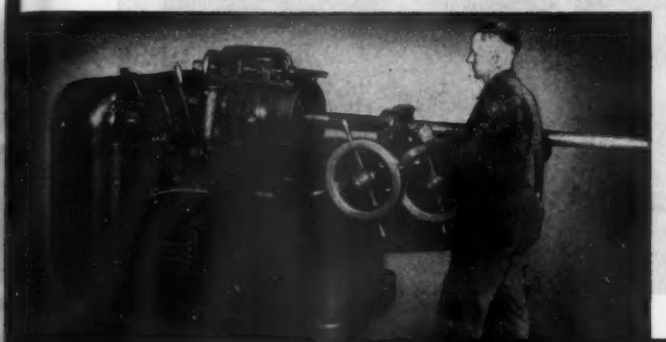
PLANTS AT 6400 BREAKWATER AVENUE, N. W. A

ACME INDUSTRY

"Acme" XN Forging Machines are of sound and proven design, incorporating rigid construction throughout, and simplicity of operation. They are available in ten sizes ranging from 1" to 5½" inclusive.

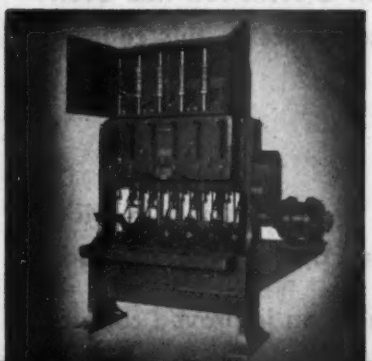


"ACME" FORGING MACHINES



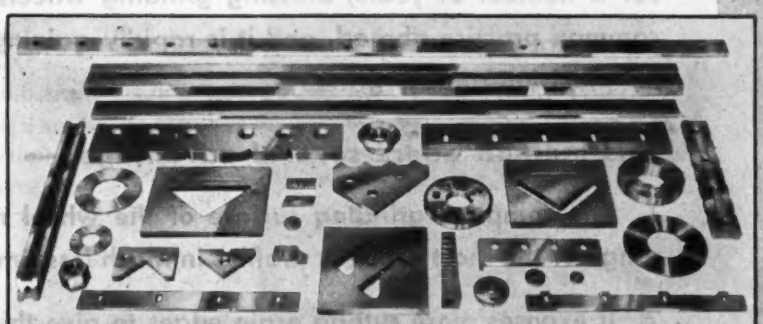
Single and Double Spindle "Acme" XL Threading Machines are equipped with the "Acme" tangent die head insuring economical and accurate high speed production. Furnished in sizes from 1" to 3" capacity.

"ACME" THREADING MACHINES



"ACME" TAPPING MACHINES

A complete line of semi-automatic Tappers for accurately threading nuts and pipe couplings.



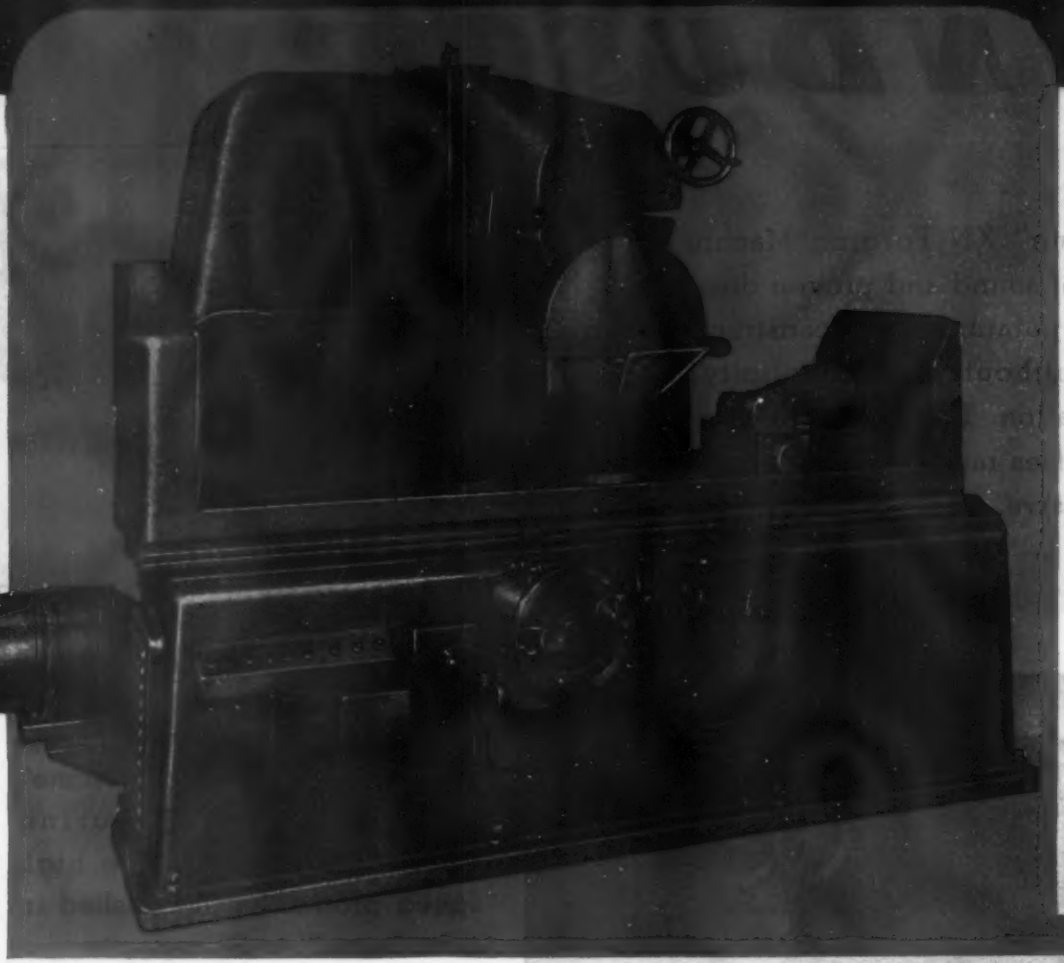
"CLEVELAND" KNIVES AND SHEAR BLADES

Solid and Laid Steel Shear Blades • • • Rotary Slitting and Side Trimming Knives • • • Metal Cutting Machine Knives, and Knife Sharpening Service.

COMPANY *Cleveland 2, Ohio*

AND 4533 ST. CLAIR AVENUE, N. E.

THOMPSON *Contour G*



For a number of years, dressing grinding wheels with a form roll has been common practice abroad, and it is rapidly gaining acceptance in this country for precision contour grinding.

This method offers several advantages—

1. The complete grinding surface of the wheel may be formed into a wide range of the most complex profiles in much less time than by any other method.

2. It exposes more cutting grain edges to give the wheel an improved cutting surface.

3. The wheel stands up better—requires fewer dressings—produces more pieces per dressing.

4. Grinding time is cut to a fraction of former methods.

5. Dressing tool cost is sharply reduced due to the greatly increased number of dressings available from the crusher roller—and due to the increased production possible from a single wheel dressing.

r GRINDER

The answer to those hard to grind precision contours!

● The Thompson Contour Grinder is the result of 10 years experience in crush form truing on production jobs and introduces the first automatic machine cycle of operation for precision contour grinding. In short, with the Thompson Contour Grinder, the operator merely loads and unloads the machine after the original setting of the wheel.

Thompson features the following automatic operations—

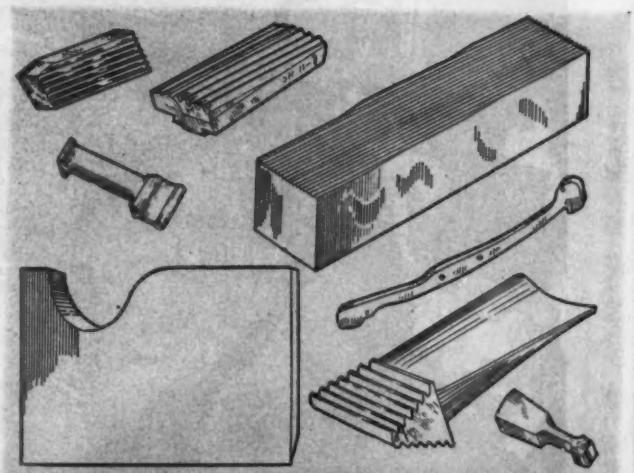
- Automatic cycle for wheel truing
- Automatic down-feed
- Automatic spark-out control
- Automatic table positioning for dressing control
- Automatic up-feed control
- Entire automatic feed cycle interlocked to prevent damage to work pieces.

Thus the variables in accuracy and production due to the human element are practically eliminated due to automatic operation of so many important functions of the machine.

The table speeds are the same as all Thompson Surface Grinders, ranging from 10 to 100 feet per minute. The Contour Grinder may be furnished in a full range of sizes. The machine shown is a 12" x 48" grinder.

Note: Crushed form truing can also be applied to a number of machines in the field without the automatic feed cycle.

The Thompson organization has the experience—facilities—and "know-how" to help you solve your contour or flat grinding problems. Contact them on your precision grinding jobs.



Some of the Contours which have been ground to precise limits by crush-form wheel truing.

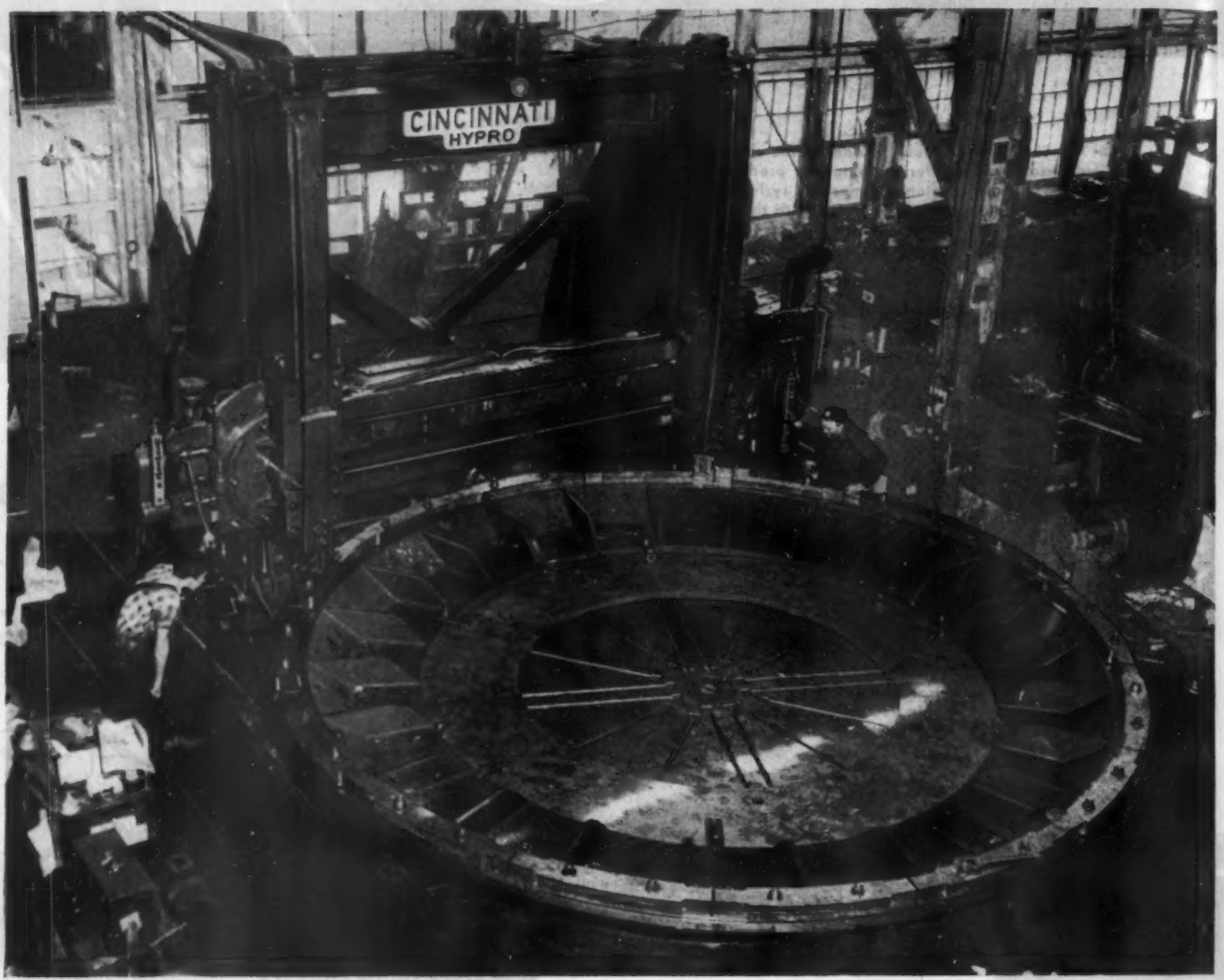
Illustrating table positioning for automatic wheel dressing operation.

Grouping of automatic controls at operators position which simplifies machine set-up and control.

THE Thompson GRINDER CO.

SPRINGFIELD, OHIO

Cincinnati Extension Boring Mill Accurately Turning A Big Job



● You may never need a Cincinnati Hypro Vertical Boring Mill as large as the machine above, which has a swing of 10′ 6″ to 20′ 4″. But no matter which size Hypro you buy you will be assured the same accuracy in boring and turning that the Joshua Hendy Co. of Sunnyvale, Cal. experienced with their Cincinnati Boring and Turning Mill.

The operation shown consists of turning the inside and outside radii on link bars for the reversing mechanism used in Liberty ship engines. Sixteen separate bars are being machined simultaneously on the 17′ auxiliary table with high speed tools ¾″ sq. The radii is maintained within limits of one-thousandths of an inch.

Write for Bulletin 175-AM describing and illustrating Cincinnati Hypro Vertical Boring Mills from 8′ to 12′-18′ Extension Type.

THE CINCINNATI PLANER COMPANY

Planers...Vertical Boring Mills...Planer Type Millers

CINCINNATI . OHIO . U.S.A.

To Help Produce Weapons of Peace...

SIEWEK

STANDARD RAPID CLAMPING DRILL JIGS

Spring or Rack and Pinion Types—Square or Oval Top Plates—Wide Range of Sizes

A large factor in winning the coming peace will be America's METHODS of production. Our factories will help rebuild both our own inventories and the countries impoverished by war.

Those plants which have been using Siewek Standard Rapid Clamping Drill Jigs for war goods will be in excellent position to convert to the "weapons of peace"—because these jigs were designed for easy adaptability on a wide variety of jobs. With their simple adapters—which are easily made right in your own shop—one Siewek Jig will take the place of dozens of special jigs.

The saving in time, labor, material and money, which Siewek Jigs make possible, will count heavily in meeting your post-war competition. Investigate these advantages today—contact your nearby Siewek representative or write us, asking for Catalog No. 50J.

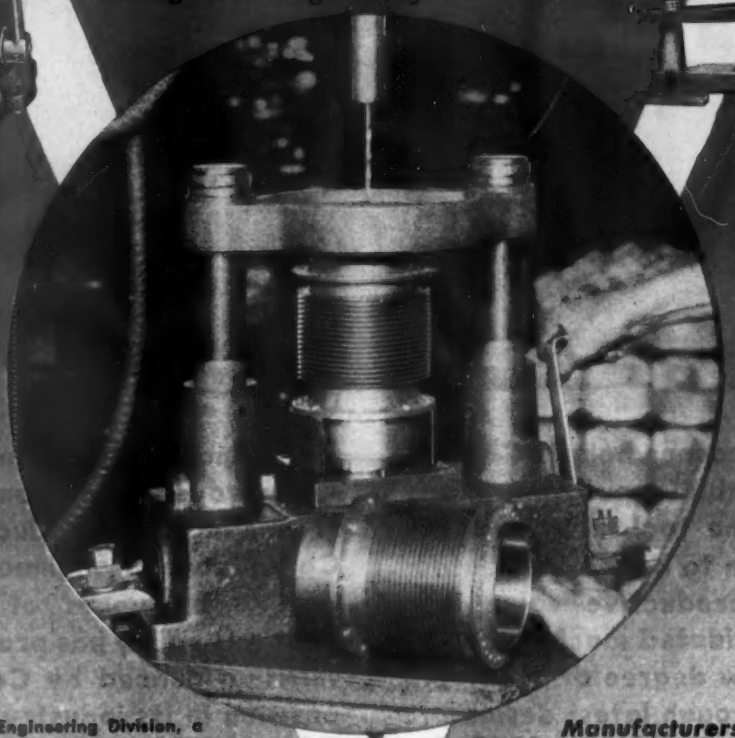
Type H Horizontal Rack and Pinion Jig for 3-way Drilling

Type B Spring Jig

Type B Spring Jig

Type C Spring Jig

Type C-L Rack and Pinion Jig



Affiliated with Siewek Engineering Division, a nationally known organization staffed with experienced engineers — Consulting, Processing, Designing and Fabricating.

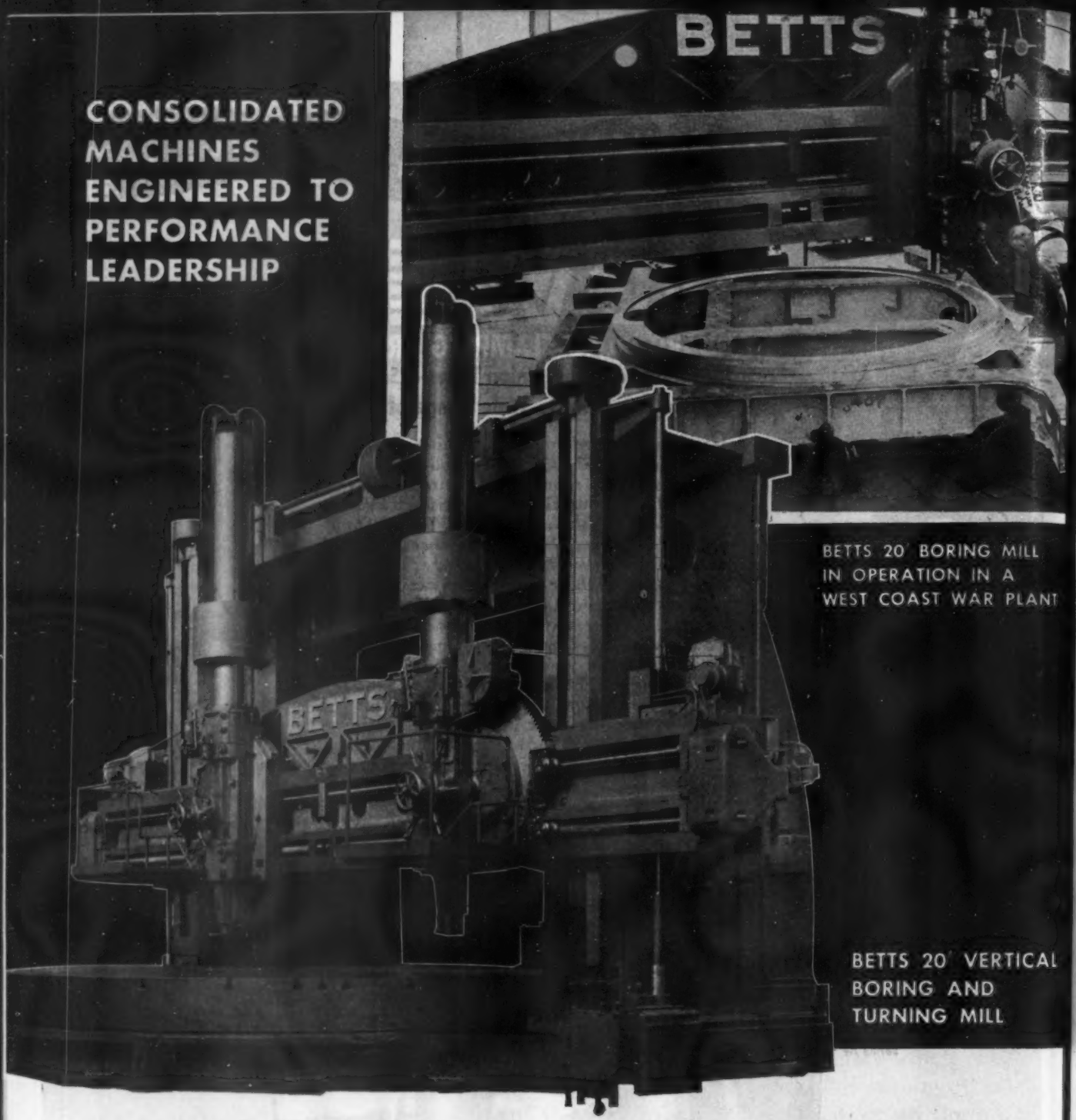
Manufacturers of PROGRESSIVE SHEAR-CUT END MILLS

SIEWEK TOOL DIVISION

OF DOMESTIC INDUSTRIES, INC.

DETROIT (FERNDALE STATION) MICHIGAN • *Representatives in Principal Cities*

CONSOLIDATED MACHINES ENGINEERED TO PERFORMANCE LEADERSHIP



BETTS 20' BORING MILL IN OPERATION IN A WEST COAST WAR PLANT

BETTS 20' VERTICAL BORING AND TURNING MILL

One of the reasons behind Consolidated's enviable reputation in the heavy machine tool industry is its determination to build the greatest amount of productive value into every Consolidated machine . . . to provide a new degree of profitable operation through latest design . . . to eliminate wasted time and effort by improved operation and control . . . and increase production through Consolidated engineering skill backed by years of experience. That this policy has proved successful is evidenced by Consolidated's position in its industry.

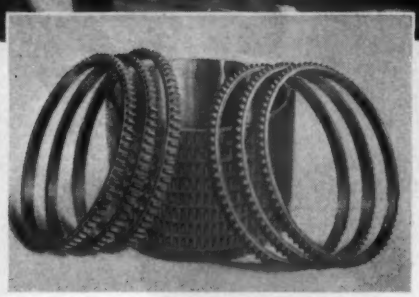
BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

BARBER-COLMAN TYPE "D" HYDRAULIC HOBBING MACHINE



- **HAS AUTOMATIC CYCLE**
- **MINIMIZES OPERATOR FATIGUE**
- **PERMITS USE OF UNSKILLED OPERATORS**
- **PRODUCES CONSISTENT HIGH QUALITY WORK**

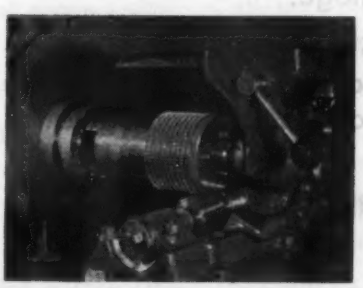
These are factors which contribute immeasurably toward reduced costs and increased output. This operator had never run a gear cutting machine until three weeks before these photographs were made. Yet she was producing excellent gears without difficulty, at the rate of one every six minutes.

The B-C Type "D" Hobbing Machine can offer you these same advantages on a wide variety of heavy duty, precision gear hobbing. It will be worth investigating as an item of first importance on your post-war buying program. Write for a copy of bulletin F-1477 for complete details.

THIS JOB...

Shown above is a heavy, accurate cut in tough steel. These ring gears are 6.698" O.D., .402" wide, have 78 teeth, 12 pitch, involute form, 22½° P.A.

Material is AMS 6312 with a Brinell of 200-220. Good finish and accuracy are required — runout within .002" on P.D., accumulated spacing error within .0015". Machine feed is .100" per minute, and hob speed 75 r.p.m. One load of nine gears is completed in 50 minutes. The hob produces 27 gears per setting and 135 gears per grind.



A close-up of the operation. Teeth are hobbed on one piece held on a special expanding arbor and the gears are cut apart after hobbing.

Buy War Bonds

BARBER B-C COLMAN PRODUCTS
HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company

GENERAL OFFICES AND PLANT • 111 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

. . . in "The Tools You Buy Again"

Small tools — at the business ends of machines working to capacity — must be capable of making time, labor and material savings in order that production demands be met. UNION TOOLS are meeting such demands in the countless plants turning out war materiel. They are saving time by faster cutting — saving labor by requiring less resharpening — conserving material by assuring accuracy and minimizing spoilage.

The ability of UNION TOOLS to make savings is traceable to an in-built fineness of quality which in turn is the result of UNION'S long, specialized experience in small tool development.

For the sake of savings, it will pay you to standardize on UNION.

Twist Drills — Milling Cutters — Reamers — Hobs — Slitting Saws — End Mills — Taps — Dies — Screw Plates — Profile Cutters.

•

UNION
TWIST DRILL COMPANY
Athol, Mass.

STORES New York Store: 61 Reade St.; Los Angeles Store: 524 East Fourth St.; Chicago Store: 11 So. Clinton St.; Seattle Store: 568 First Ave., So.; San Francisco Store: 121 Second St.; Detroit Store: 5527 Woodward Ave.

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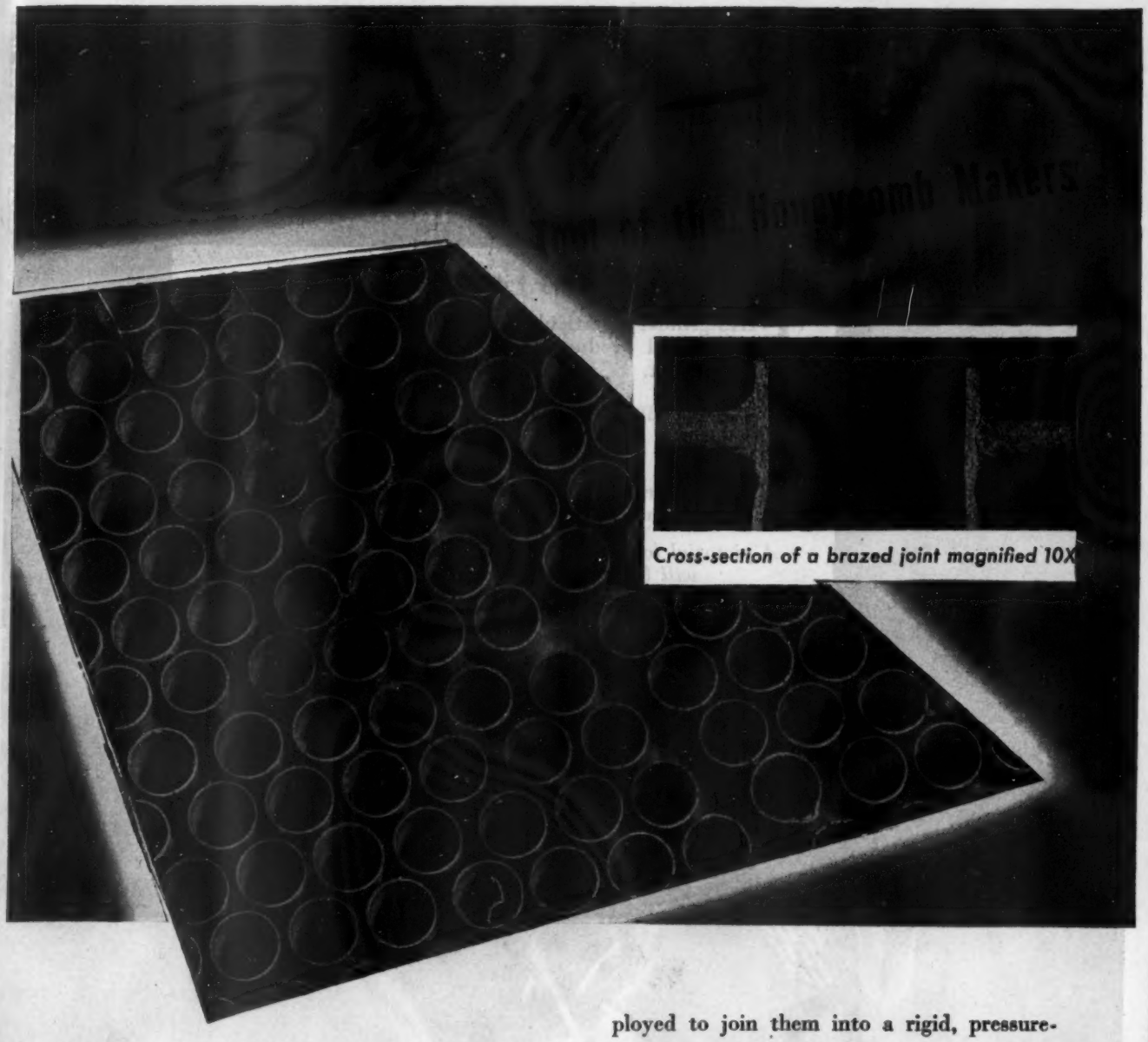
S. W. Card Mfg. Co., Div.; Mansfield, Mass.
Butterfield Division, Derby Line, Vt., and Rock Island, Quebec

UNION



Cross-section of a brazed joint magnified 10X

Fabrication of lightweight aluminum cores for many types of heat exchangers—aircraft radiators, oil coolers, heaters—is accomplished by brazing. Aluminum alloys contribute strength and light weight, superior heat conductivity and resistance to corrosion. The brazing process provides speed and uniformity of production.

In the tubular-core section pictured above, thin-walled aluminum tubing and Alcoa sheet, perforated to receive the tubes, are assembled in a fixture which holds all parts firmly in place. Furnace-brazing is then employed to join them into a rigid, pressure-tight unit. Other fabricators may employ flux-bath brazing, hand welding and brazing, or combinations of all methods.

How the molten brazing alloy flows at the line of contact, forming a fillet which bonds all parts securely together, is seen in the above photomicrograph.

Alcoa will assist you in adapting the brazing process to your products, advising on initial and final cleaning methods, fluxes and brazing temperatures. For this help, write ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA ALUMINUM

Versatile

•IN CONSTRUCTION •IN APPLICATION

. . . The Norton Multipurpose

THIS grinder's particular field is in miscellaneous, small-lot general production, in difficult applications, or in tool room work.

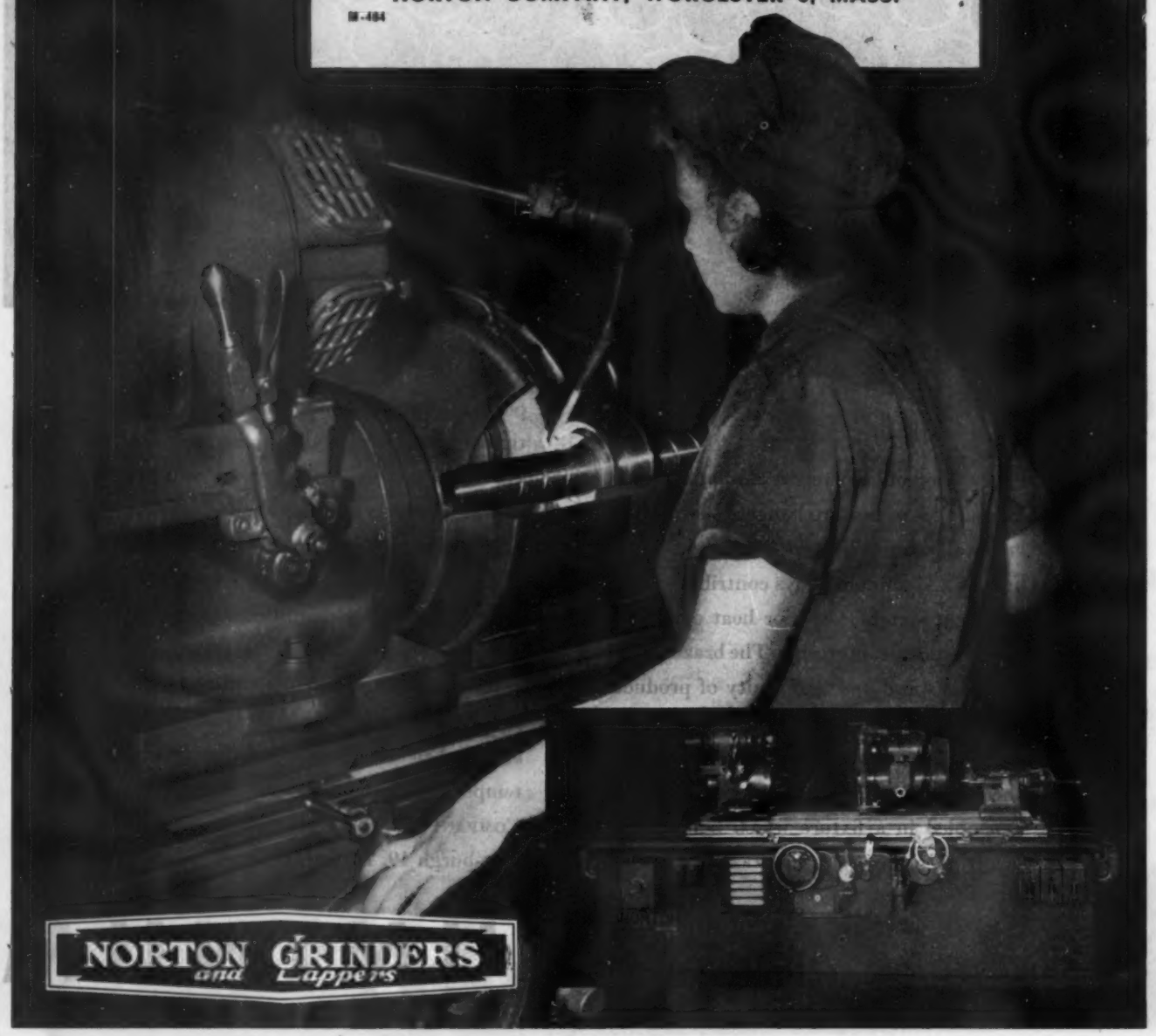
Its standard equipment, mounted on a massive base, gives versatility to handle a variety of work—quickly and accurately.

Within arms' reach of the operator's normal position are all the principal machine adjustments and operating controls.

A pictorial folder on the Norton Multipurpose Grinder will be sent on request—no obligation.

NORTON COMPANY, WORCESTER 6, MASS.

M-484



NORTON GRINDERS and Lappers

IT'S METRO FOR REGULAR PRODUCTION AND SPECIAL JOBS TOO!

Turn to Metro for Gages and Carbide Tipped Tools . . whatever your problem—whatever your requirements are. For if a standard tool or gage is not exactly adaptable to a given difficult or special job, Metro engineers will design and produce for you a tool or gage that is.

Standard Gages and Carbide Tipped Tools are immediately obtainable through your Metro Distributor.

Write today for free catalog

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TOOL AND GAGE CO.

4240 Peterson Avenue

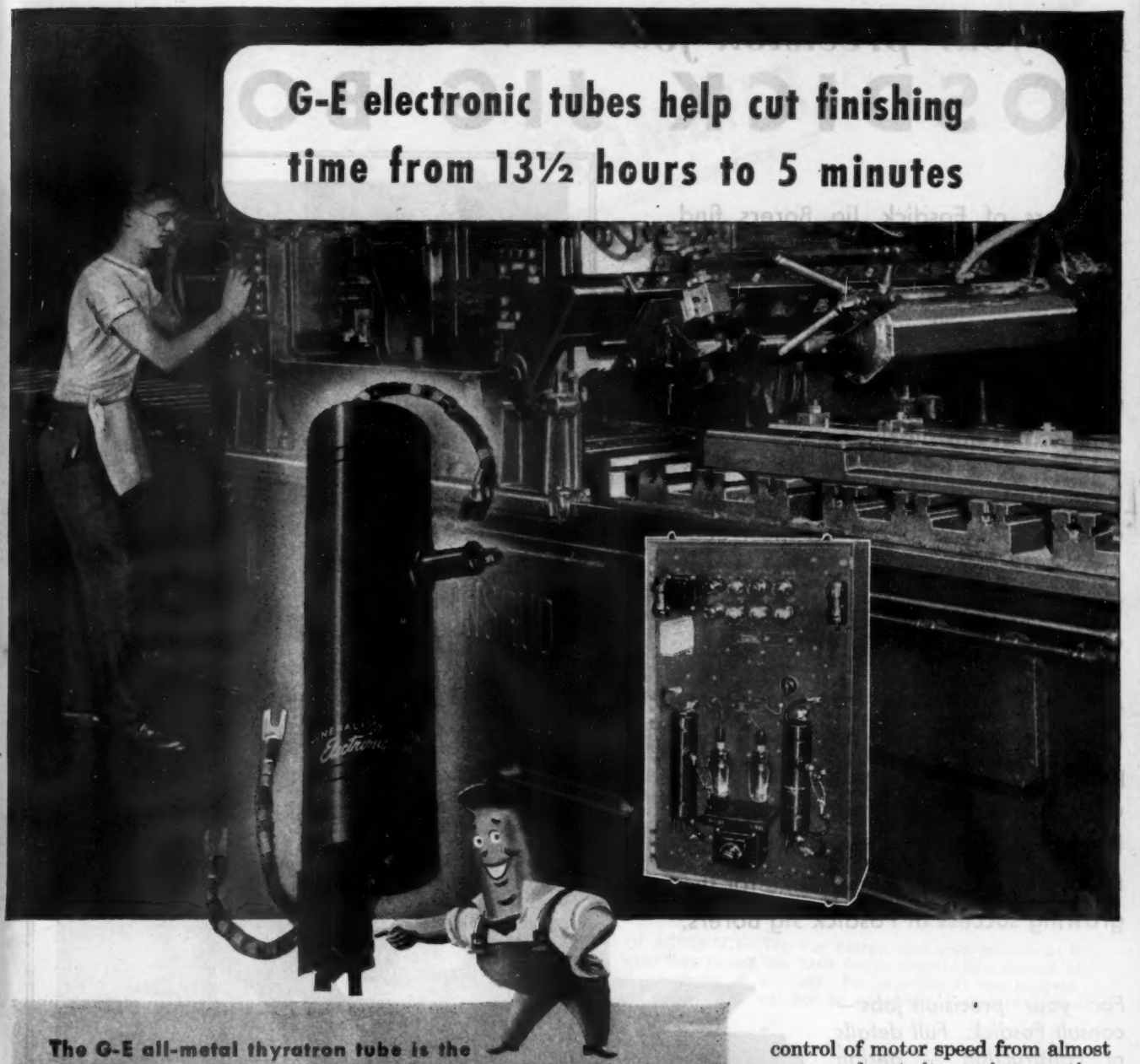
Chicago 30, Illinois

NEW INGERSOLL ADJUSTABLE ROTARY MILLS LOCOMOTIVE RODS *Faster and Easier*

Ingersoll pendant control makes this heavier, more powerful machine faster, and easier to operate. With all the machine's movements at his finger tips, the operator can change the feed, speed, depth and direction of cut without interruption — while the cutter is working. He can establish maximum machining rates on any material by actual test at the start of the cut. He gets more work done by eliminating slow feed rates and time spent cutting air — and does this by simply pressing buttons.

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILL.

G-E electronic tubes help cut finishing time from 13½ hours to 5 minutes



The G-E all-metal thyratron tube is the "heart" of the Thy-mo-trol unit that maintains correct machine speed for every load.

G-E electronic tubes in the G-E Thy-mo-trol Drive provide the multiple-timing control that has speeded up finish time on milling of aluminum spar beams for aircraft wings from one unit in 13½ hours to one unit in 5 minutes!

Onsrud Machine Works, Inc., met the requirements for increased production by designing its giant contour milling machine to include the G-E Thy-mo-trol Drive—the electronic-tube control unit that provides the smooth, stepless motor control for handling such complex factors as varying feed speeds for synchronizing with tool-cutting depths, controlling changing feeds, and high accelerations for fast "skips" when no cutting at all is required.

Electronic-tube control of d-c motors is applicable to drill presses, pump drives, lathes, boring mills, screw machines, and all other motor-driven machinery where a *right* speed is required for the job.

The heart of the electronic motor control, the G-E Thy-mo-trol Drive, is the G-E thyratron tube. This tube is a virtual stepless rheostat that controls with no moving parts the flow of current to give smooth, stepless control of motor speed from almost zero speed up to its maximum rating. The thyratron is but one of the complete line of G-E electronic tubes for industrial applications. Through its nation-wide distributing system, General Electric is prepared to supply users of electronic devices with replacement tubes. Ask your distributor for information on G-E thyratrons or any other type of industrial tube, or write *Electronics Department, General Electric Company, Schenectady, N. Y.*

Tune in General Electric's "The World Today" and hear the news from the men who see it happen, every evening except Sunday at 6:45 E. W. T. over CBS network. On Sunday evening listen to the G-E "All Girl Orchestra" at 10 E. W. T. over NBC.

G.E. HAS MADE MORE BASIC ELECTRONIC-TUBE DEVELOPMENTS THAN ANY OTHER MANUFACTURER

GENERAL ELECTRIC

162-C12-8850

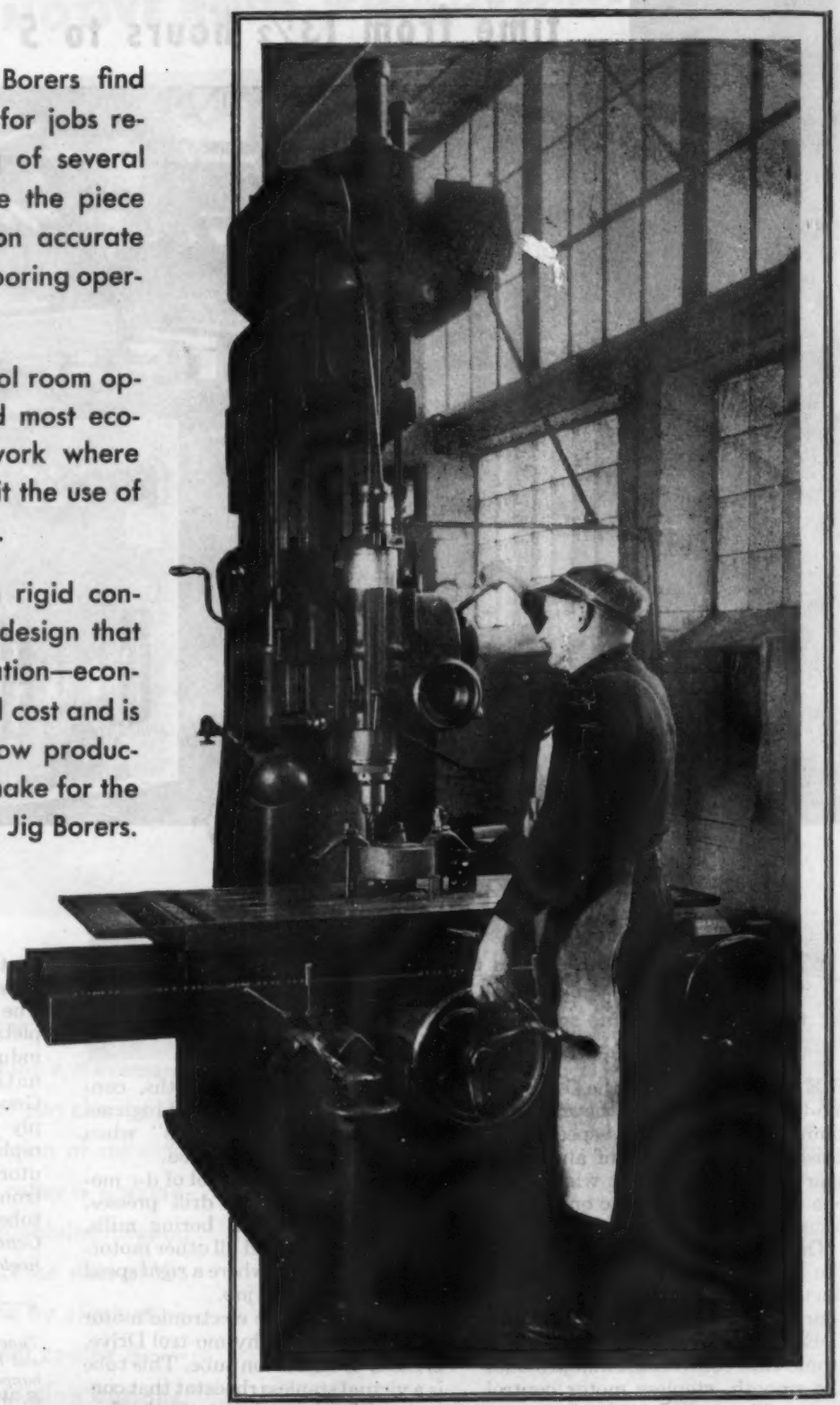
For your precision jobs . . .

FOSDICK JIG BORER

● Users of Fosdick Jig Borers find them extremely accurate for jobs requiring precision spacing of several holes. On small work like the piece shown you can depend on accurate drilling — reaming — and boring operations with this machine.

Particularly adapted to tool room operation it has also proved most economical on production work where time or costs did not permit the use of expensive jigs and fixtures.

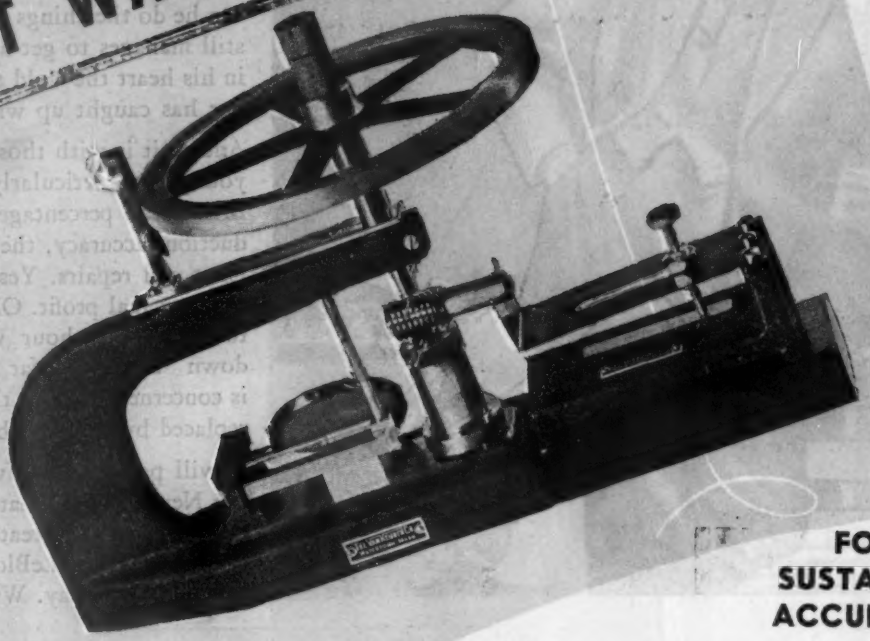
Accuracy that stems from rigid construction—versatility from design that permits wide range application—economy that begins with initial cost and is further evidenced in the low production cost—are points that make for the growing success of Fosdick Jig Borers.



For your precision jobs — consult Fosdick. Full details of construction — design features — and numerous examples of operating economy are found in the Fosdick Jig Borer Bulletin J.B.A. Write for a copy today.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, · · · OHIO

LIGHT WAVE MICROMETER



FOR SUSTAINED ACCURACY

The Van Keuren light wave micrometer is described in catalog No. 33. This book also gives complete tables and simplified formulas for measuring all standard threads, splines and spur gears. *Write for your copy!*

NEW SYSTEM OF ACCURACY—The Van Keuren light wave micrometer is an instrument which has formed the basis for an entirely new method of maintaining high standards of accuracy. No gage blocks are required. Errors from worn gage blocks will not be constantly duplicated in the product.

A calibration chart showing the micrometer screw corrections to .00001" is furnished with each instrument. The new type of hardened and ground precision micrometer screw actually improves with use. Fine workmanship and carboloy wearing surfaces make the instrument accurate and dependable for years of constant service.

CONTROLLED PRESSURE ASSURES UNIFORMITY—By using the sensitivity of light waves the light wave micrometer insures the exact duplication of measuring pressure by any operator. This controlled pressure feature makes it possible to measure hard or soft materials, and for readings to be duplicated by different operators to .00001".

IDEAL FOR SHOP MEASUREMENTS—The light wave micrometer is ideal for making measurements by the 3 wire method, for measuring plug gages, measuring wires, precision parts and shop standards. It is a reference instrument. Forget about comparative measurements with gage blocks—use the light wave micrometer. It is fast, accurate and profitable.

THE Van Keuren CO., 176 WALTHAM ST., WATERTOWN, MASS.

25th YEAR

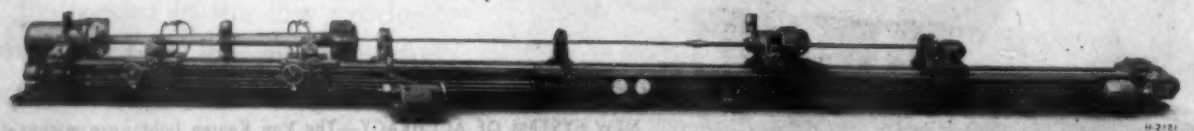
Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles

"never felt better in my life!"

Such a remark coming from an "old timer" merits but one reply—a skeptical "Oh, Yeah!" A man in his dotage never feels as good as he did in the prime of youth. Neither can he do the things he used to do. True, he still manages to get around, but down deep in his heart the "old timer" knows that old age has caught up with him.

And so it is with those old machine tools in your plant, particularly the lathes. Just check their scrap percentages, their speed of production, accuracy, the time out for readjustment and repairs. Yes, they're turning, but not at a real profit. Old lathes, old machine tools are man-hour wasters, costly "slow down" artists. As far as profitable operation is concerned, they're through. They must be replaced by new and better machines.

It will pay you to investigate the merits of the New LeBlond Lathes. They'll help you meet tomorrow's greater, keener competition with confidence. LeBlond is building tomorrow's lathes today. Write for catalog.



SPECIAL LeBLOND COMBINATION GUN BORING AND TURNING LATHE

YOURS FOR THE ASKING

We have been building lathes since 1887. Today LeBlond Lathes are used on turning operations the world over. The accumulated knowledge of every manufacturing trend in good times and bad . . . peace and war, gained from thousands of installations is now available to you.

Our field engineers are at your service . . . ready to help you in your development work for the postwar era—particularly along the lines of the difficult, out-of-the ordinary turning problems.

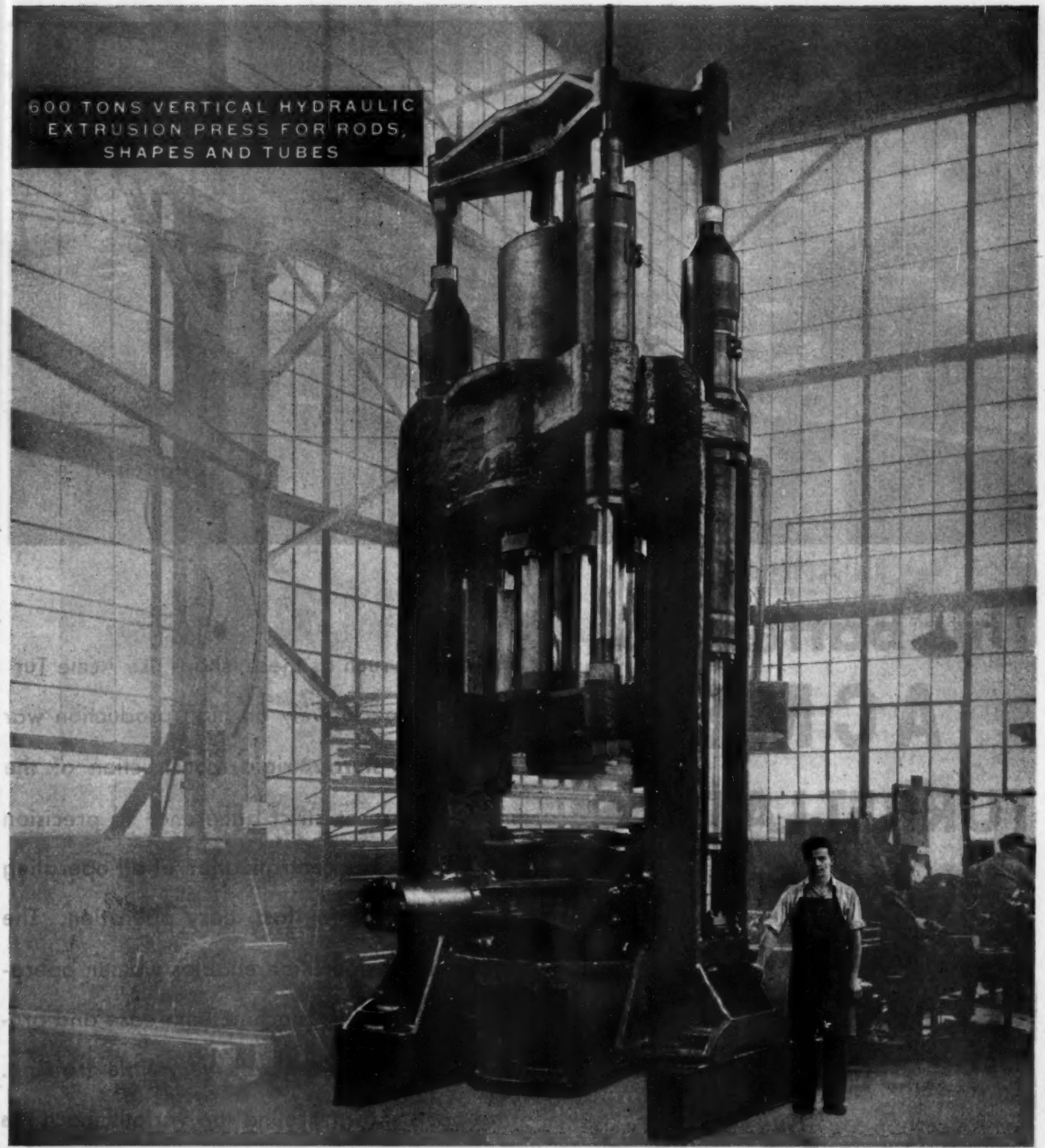
This service is yours for the asking. Contact our nearest dealer or write—Department FE-46.

★ YOUR BONDS BUY BOMBS ★
BUY A "BLOCK-BUSTER" TODAY!

THE R. K. **LeBLOND** MACHINE TOOL CO., CINCINNATI 8, OHIO, U. S. A.

NEW YORK 13, 103 Lafayette St., CAnal 6-5281
CHICAGO 6, 20 N. Wacker Dr., STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES



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HYDRAULIC PRESSES · ROLLING MILLS
STRETCHERS · PUMPS · ACCUMULATORS

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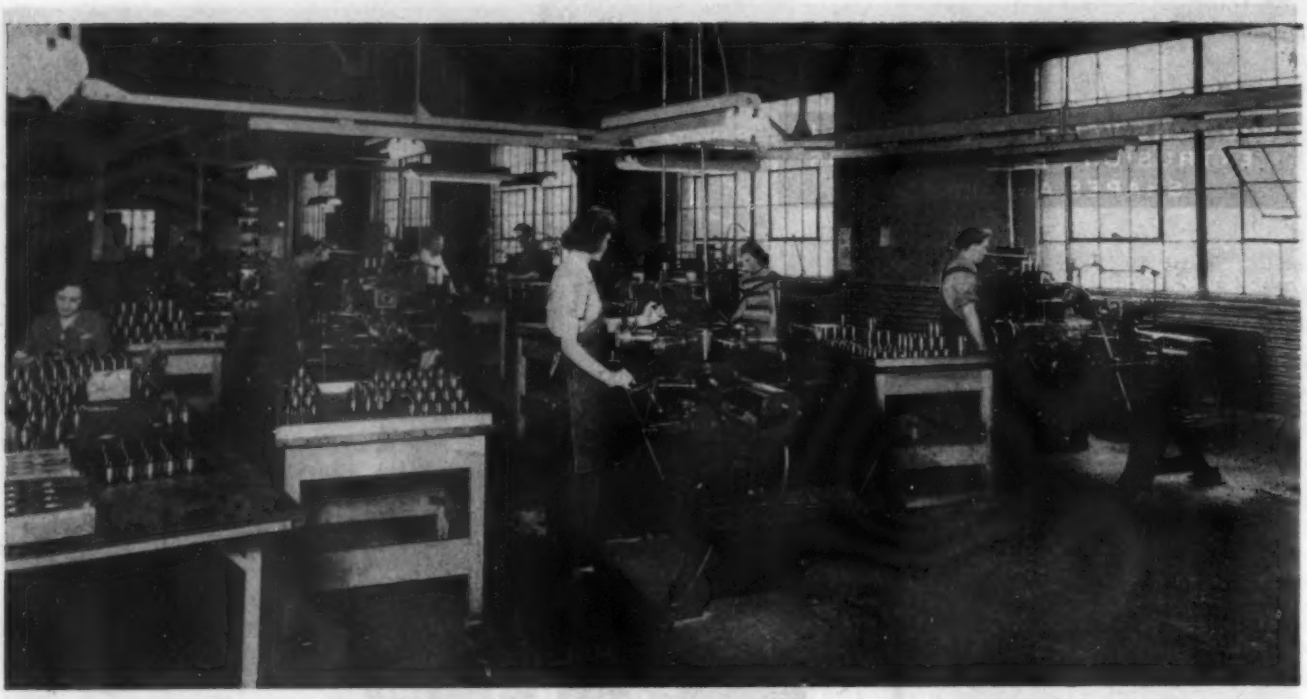


This battery of ACME TURRET LATHES MEET DEMAND FOR HIGH PRODUCTION

★

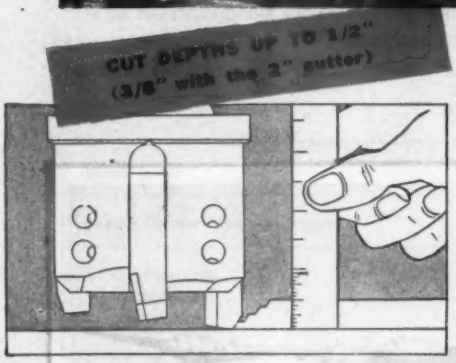
● For jobs such as these, shops use Acme Turret Lathes exclusively on high production war work. The sturdy, rigid, construction of the machine assures strict adherence to precision tolerances. The centralization of all operating controls makes for fast, easy operation. The simplicity of operation enables women operators to handle the machine with ease and produce precision work with very little training. The parts shown around the various machines are completely finished on this battery of Acme Turret Lathes. For power — precision — speed and flexibility, put your next job on an ACME.

The ACME MACHINE TOOL CO. ... CINCINNATI 32, OHIO.

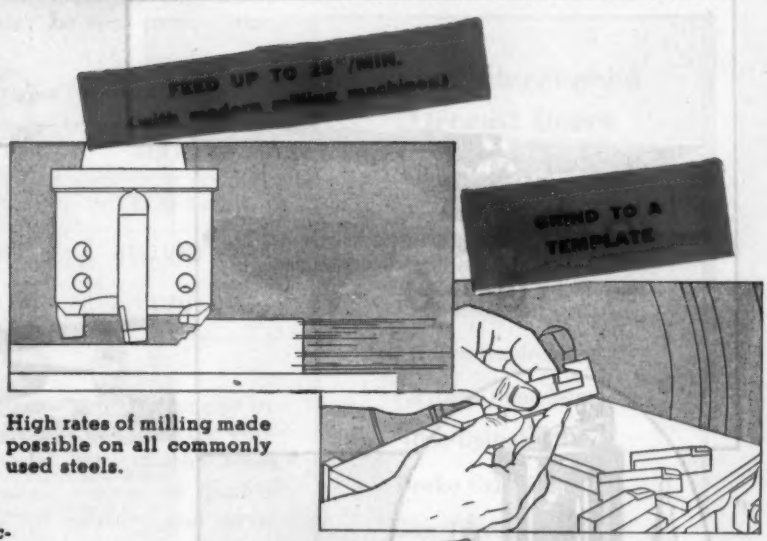
KENNAMILL STEP-CUTTERS

A Simplified Means To Multiply Milling Production with Available Equipment

Kennamills are inserted blade fly-cutters that, in most cases, enable available horsepower to be fully utilized in chip removal.



Desired depth of cut is divided into equal steps.



High rates of milling made possible on all commonly used steels.

Blades are resharpened to template on ordinary carbide tool grinder.

Kennamills bring the advantages of high-production carbide milling of steel to every shop that has milling machines of reasonably recent manufacture. They are inexpensive, easy to set-up, and a cinch to maintain. Get in step with modern carbide milling by using this simplified method—write today for catalog information on Kennamills.

Grinding in the head is unnecessary.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc., LATROBE, PA.

***Yesterday**—Only true pioneers and thrill seekers would ride in the rickety "egg crate" plane. Yet that plane, with all its crudities, was a giant step in human progress and transportation. Without early abrading, processes such as grinding, it would have been impossible.*

Today—The giant air liner is a tremendous improvement on the plane of yesterday—as is the modern fighter or bomber over the planes of World War I. HONING—the advanced abrading process—helped to make this improvement possible. Safety, lightness, long operation without overhaul—all are dependent to some degree on HONING.

Tomorrow—We do not know what course the progress of air transport will take. But whatever it is, there will be greater need for better controlled machining processes.

Micromatic has developed the HONE ABRADING process to be ready for these advanced requirements. At present, HONING application is limited to serious war needs. Tomorrow, it can expand with many new applications already developed.

HONING

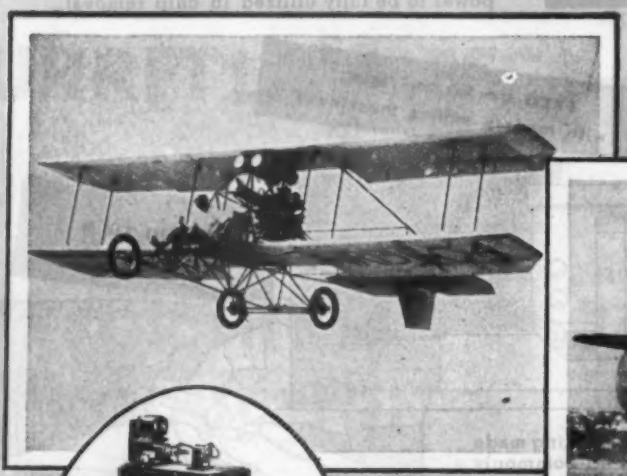
helped to develop yesterday's

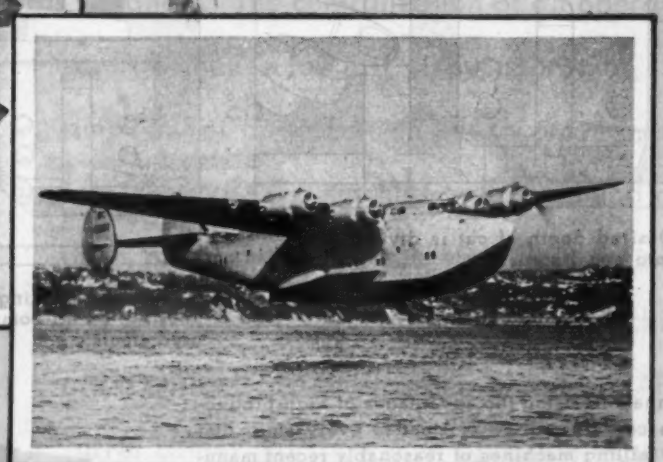
'EGG CRATE' Plane

into the

SAFE, MODERN AIR TRANSPORT

MICRO MATIC





Micromatic HONE CORPORATION

Detroit, Michigan

MAKERS OF HONING MACHINE TOOLS

HONING helped create "400" Aviation

The tactical need for outflying our enemy has crowded military aviation into the "400" bracket, as may be seen in the comparison below:

	WORLD WAR I	WORLD WAR II
Speed	130 MPH	400 MPH
Period Between Engine Overhauls	40 Hours	400 Hours
Tactical Ceiling	12,000 Feet	40,000 Feet
Engine HP	125 HP (Liberty)	2,000 HP

This amazing advancement has been accomplished largely by better engineering design, better metallurgy and better controlled machining. Microhoning provides one of the most important machining controls by assuring maximum quality and safety in the bearing surfaces of our military and naval plane engines and other plane mechanisms.

Bearing bores and other critical surfaces are finished by Microhoning—the modern abrading process which removes stock at rates up to 65 cubic inches per hour, generates accuracy for roundness and straightness of bore within .0002″ to .0003″ and any desired surface finish.

Better planes for war mean better planes for the peace to come.

Some Microhoned Aircraft Bores

Engine Cylinder Barrels
Master Con Rod (all bores)
Articulated Rod (all bores)
Piston Pin Bores
Valve Guide Bores
Pinion Gear Bores
Oleo Cylinder Bores
Brake Cylinder Bores
Gun Turret Hydraulic Cylinder Bores and many other parts

MICRO MATIC

MICROMATIC HONE CORPORATION

DETROIT, MICHIGAN

REED MICROMETERS

are again available with LOCK-NUT RATCHET

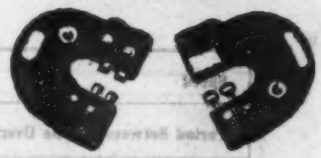
Immediate Delivery from Stock

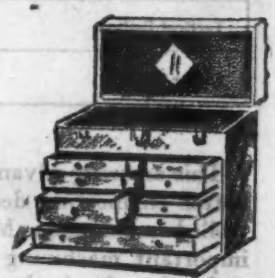
1/10,000 vernier standard in 1, 2, and 3 Inch Sizes AT NO EXTRA COST

Highest accuracy at less cost is assured by REED MICROMETERS. These precision measuring tools—the result of over thirty years specialization—are provided in 1", 2" & 3" sizes with graduations enabling accurate and easy readings up to 1/10,000 AT NO EXTRA COST, thereby meeting today's and tomorrow's demand for tools capable of measuring tolerances in "tenths." 4, 5, & 6" Sizes Read to 1/1000".

REED MICROMETERS can be depended on for lead accuracy over the full measuring range, longer life, easy readings on thimble and vernier and fine sensitivity and smoothness in use. They are available in a wide range of sizes and combinations for every shop need. Write for 8 page bulletin giving complete details and prices.

THE REED YOU BUY TODAY WILL BE THE MICROMETER YOU'LL USE FOR MANY YEARS TO COME

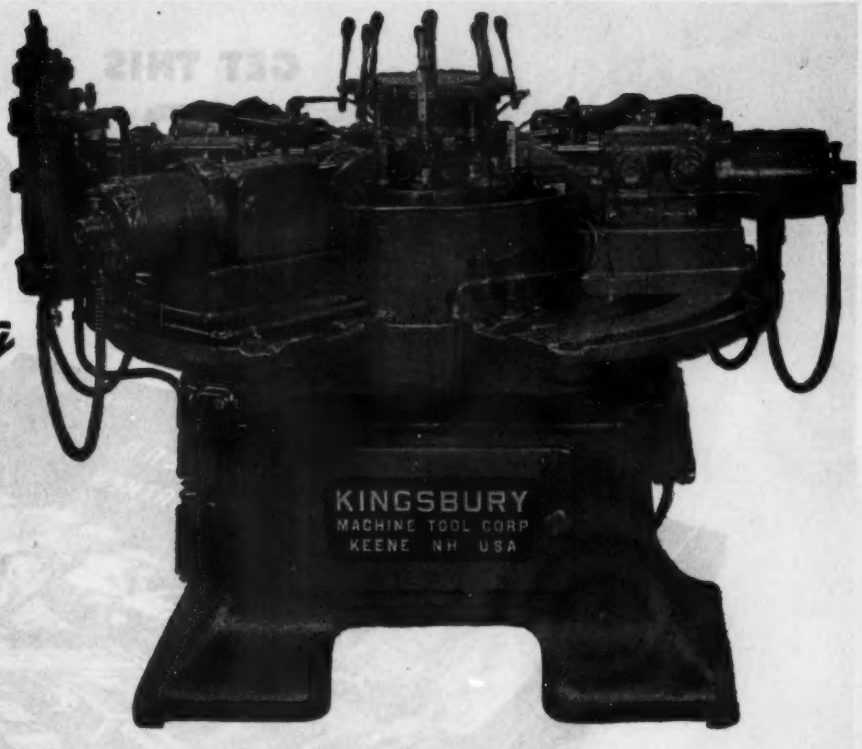




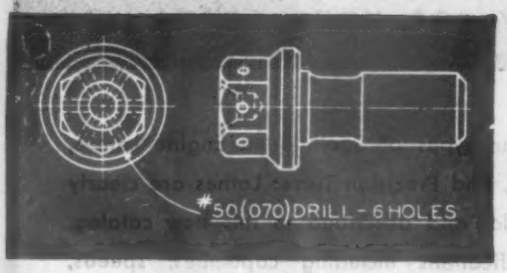
Ask to be placed on our mailing list to receive "PRECISION PRODUCTION" which is published at regular intervals and is of vital interest to any one concerned with attaining highest accuracy in tool room and shop. Your request involves no charge or obligation.

GEORGE SCHERR CO.
INCORPORATED
200 LAFAYETTE STREET, NEW YORK 12, N.Y.

Loading and Unloading While Drilling assures Continuous High Production



FLEXIMATIC



by KINGSBURY

This six-spindle FLEXIMATIC is set up for drilling lacing holes in the heads of screws for airplane motors. High production, so essential to parts involved in the speeded up program of this important phase of National Defense, is being achieved with minimum effort on the part of the operator.

The main turret of this FLEXIMATIC contains eight individual turrets which index 60° at each index of the main turret. Each of the six automatic drilling units on the machine drill a hole from the outside face of the hex head into the center only. The operator merely loads and unloads at the loading station while the holes are being drilled at the other stations on the machine. All six drilling operations are performed in a single chucking of the work.

Speed, convenient handling, accuracy and continuous production are universally recognized advantages offered by FLEXIMATICS regardless of the nature of the job assigned them to handle. The specific work being performed here is typical of many others where FLEXIMATICS are the machines for jobs calling for the maximum in time savings.

THIS IS A FLEXIMATIC AIRPLANE JOB!

Kingsbury Standard Units for drilling, reaming, boring, spotfacing and milling can be mounted in any combination, operated automatically and changed over quickly and easily to suit the requirements of the work to be handled.

KINGSBURY MACHINE TOOL CORPORATION

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New South Bend Lathe CATALOG

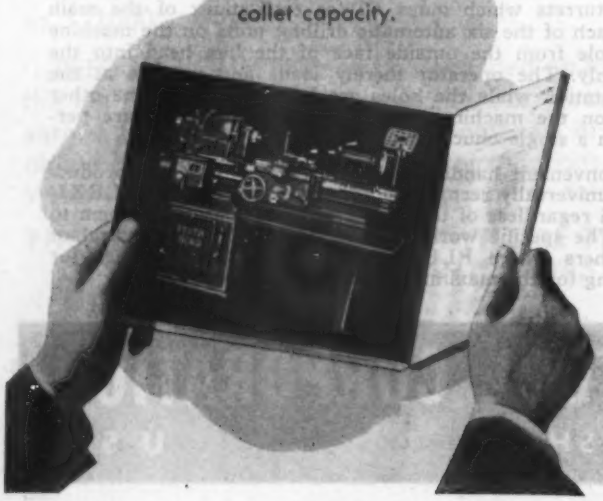
MAILED ON REQUEST . . . WRITE TODAY FOR YOUR COPY

SIZES AND TYPES OF SOUTH BEND LATHES

Engine Lathes — 9" to 16" swing, 3' to 12' bed length.

Toolroom Lathes — 9" to 16" swing, 3' to 8' bed length.

Precision Turret Lathes—½" and 1" maximum collet capacity.



All sizes and types of South Bend Engine Lathes, Toolroom Lathes, and Precision Turret Lathes are clearly illustrated in color and described in this new catalog. Complete specifications including capacities, speeds, feeds, and weights are printed opposite the illustration of each lathe. All construction features, accessories, and attachments are also shown. Every user of machinery should have a copy of this catalog at hand for ready reference. Contains 64 pages, 11" x 8½" for standard file. Write today for your copy of Catalog 100-D.

Also, ask for details of our Post-War Priority Plan if you are now planning for the future. This will assure you prompt delivery when civilian production is resumed.

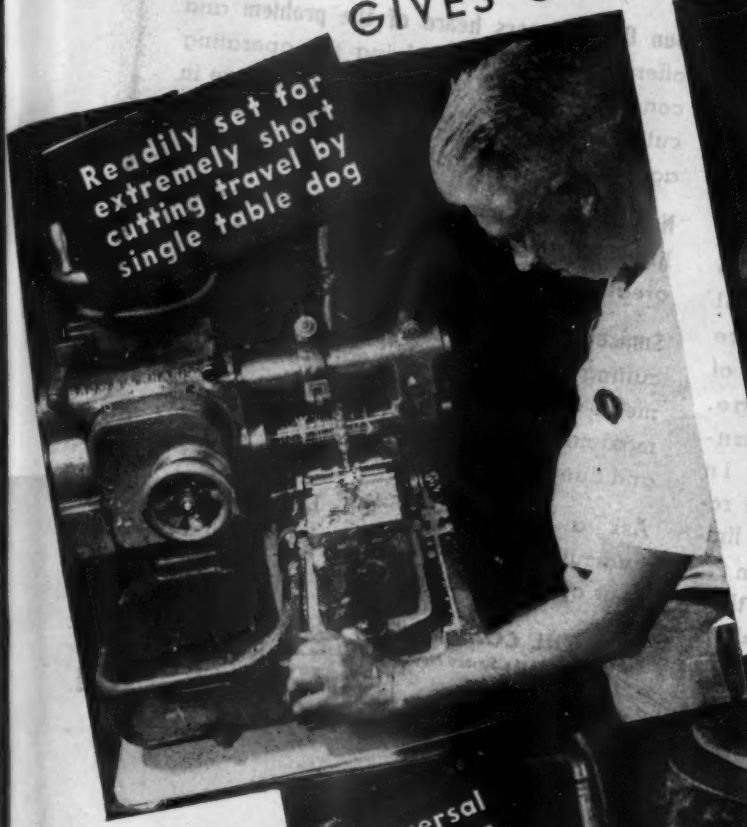
BUY WAR BONDS • SAVE FOR LATHES

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 38 YEARS
SOUTH BEND 22, INDIANA

No. 000's *Simple and Rapid Operation*

GIVES GREATER MILLING EFFICIENCY



Investigate the No. 000 Plain Milling Machine for the rapid milling of your small parts.

BROWN & SHARPE MFG. CO.
PROVIDENCE 1, R. I., U. S. A.

Automatic Cycle –
Simply load . . . pull starting lever —table returns automatically to starting position at completion of cut

BROWN & SHARPE

RAISES TOOL LIFE 5 Times!

SUNICUT

increased tool life from 75 to 380 pieces per grind

When maximum tool life on an automatic machining operation is raised from 75 pieces to 380 pieces — simply by changing the cutting oil — it's a story every production man interested in saving time, money or material wants to hear. Well, here it is!

Output was 30 to 75 pieces per tool grind, and there was a high rate of drill breakage. Time and manpower lost in changing and regrinding tools limited production . . . and to add to their troubles, finish of parts was poor.

Sun Oil Engineers heard of the problem and offered help. After studying the operating conditions, they recommended a change in cutting oils to Sunicut. The shop foreman agreed to a 3-months' trial.

Now 380 pieces per grind is their average tool life — an increase of 305 pieces! Finish is greatly improved . . . and production is up.

Sunicut . . . a clear transparent sulphurized cutting oil . . . has high heat-absorbing and metal-wetting qualities . . . making possible maximum tool life, nth degree accuracy and fine finish.

Ask a Sun Cutting Oil Engineer how Sunicut's advantages can be applied to your own shop. Write today to . . .

SUN OIL COMPANY • Philadelphia 3, Pa.

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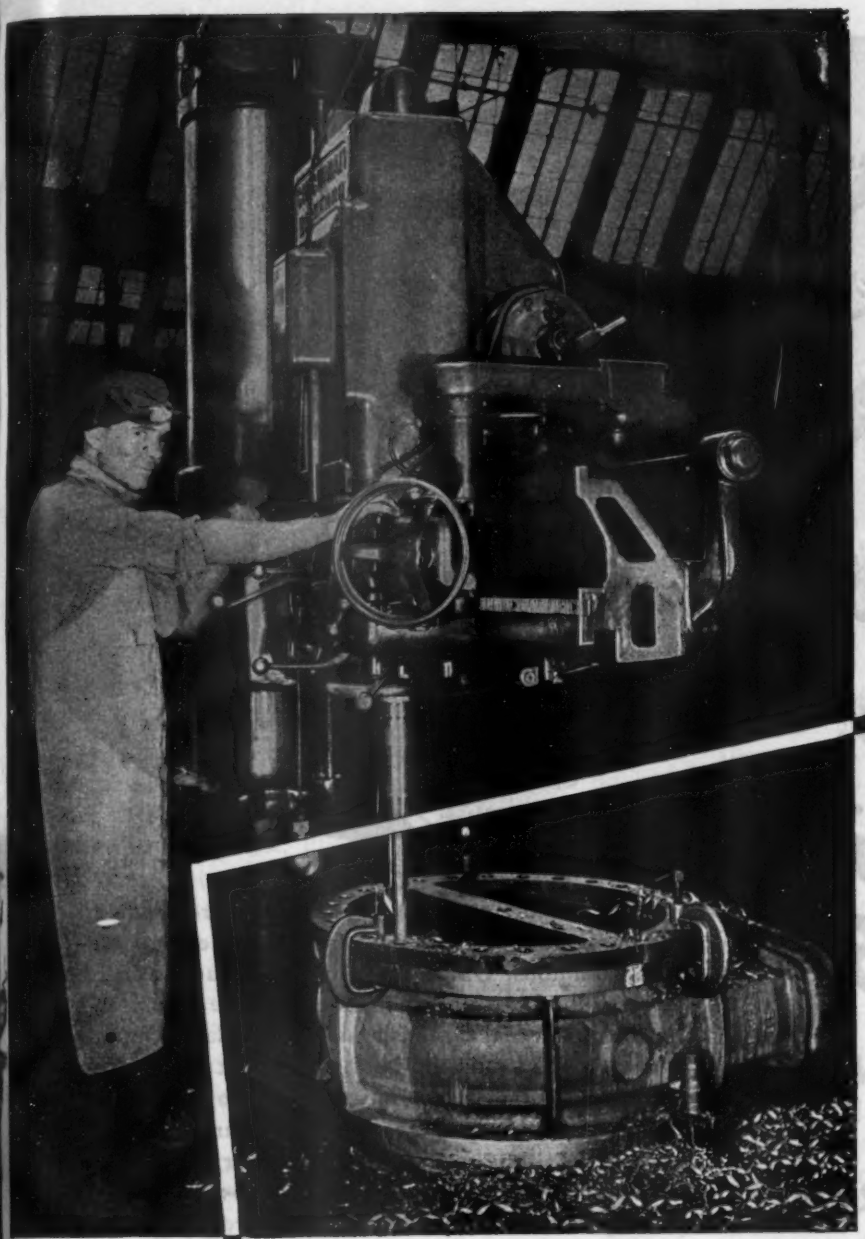
HELPING INDUSTRY HELP AMERICA



. . and still More Speed

A Radial Drill which responds to the "all out" demands of industry geared to an unprecedented War production is the Cincinnati Bickford Super Service. In numerous plants batteries of these famous Radials are delivering peak production 24 hours a day, 7 days a week—delivering priceless assets of Accuracy and Absolute Dependability. Cincinnati Bickford designs, aimed at "more-holes-per-dollar", are today proving their value.

• Operations Photograph: Courtesy The Darling Valve & Mfg. Co. Drilling 78 holes, 1⅜" dia. through 2 - 1/16" cast steel. Floor to floor time 103 min. "More-holes-per-dollar" design nets savings of 15% over machine previously used on this job.

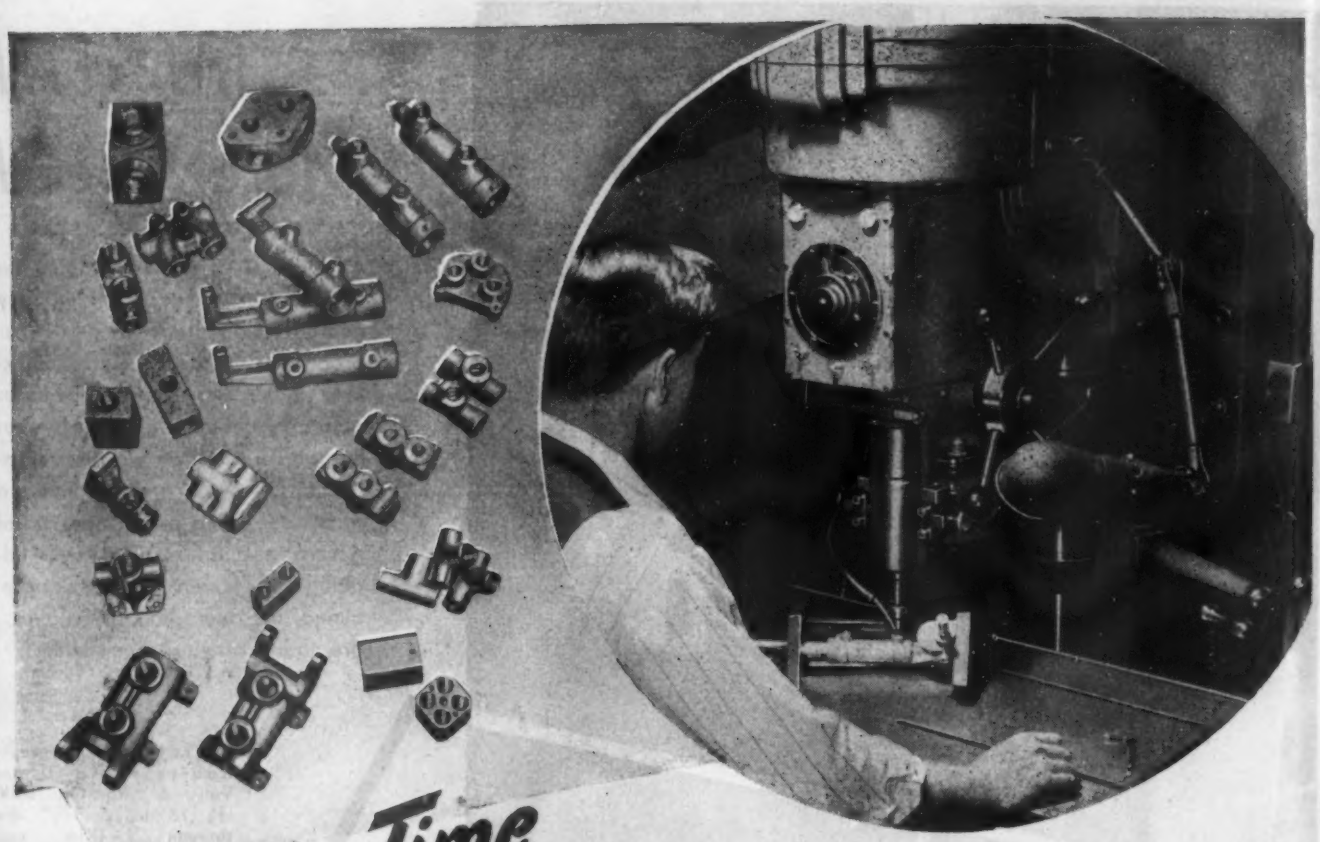
SUPER SERVICE RADIAL

ARMY E NAVY

SUPER CB SERVICE

THE CINCINNATI BICKFORD TOOL CO.

OAKLEY • CINCINNATI 9 • OHIO • U. S. A.



Tapping Time reduced 35%

ON A WIDE VARIETY OF PRECISION PARTS

MANY finely finished aircraft parts are made in large volume by the Denison Engineering Company, Columbus, Ohio, and each part must pass the exacting specifications demanded by the Army Air Corps. All internal threads must test to Class 3 fit and depth of thread must be held to .010. It is exacting work and any inaccuracy means scrapping the piece.

A Warner & Swasey Tapping and Threading Machine shows a time-saving of 35% over former method. Extreme precision in cutting threads is maintained by the patented mechanism of lead screw operating against electrically actuated guide fingers to insure positive lead free of backlash or drag. Another feature which protects the work and prolongs tap life is the safety clutch, adjustable to type of material, which releases to stop operation if the tap encounters a hard spot or strikes a jammed chip in a blind hole. Tapping depth is automatically controlled simply by setting a dial. This super-sensitive depth control electrically repeats depth limits as close as 1/10th revolution of the tap.

WARNER & SWASEY
Precision TAPPING AND THREADING MACHINES
4 Models—for All Types of Materials
Capacities (Steel) 0-80 to 1⅛"
Soft Metals and Plastics 0-80 to 2½"

Ask your Warner & Swasey field man to explain the many advantages of this radically improved tapping and threading machine for precision work..or write for descriptive catalog.

YOU CAN MACHINE IT BETTER, FASTER FOR LESS . . . WITH A WARNER & SWASEY

TURRET LATHES, SADDLE AND RAM TYPES—CHUCKING AND BAR TOOLS—TAPPING AND THREADING MACHINES

Postwar Cooperation Needed

LONDON—EVERYWHERE I GO in the United Kingdom, I find an eager desire on the part of the people for Anglo-American cooperation to continue after the war. Britishers are now approaching the end of a second great war within little more than one generation, a war much closer home than Americans have experienced. And they don't want it to happen again. They are convinced beyond doubt that prevention of another war is dependent more than anything else upon the two great English speaking nations—Britain and America—agreeing upon a program and carrying it out in unison.

The first step in that direction is to have a meeting of minds on economic matters instead of giving way to unbridled bitter "no-quarter" trade competition in the far corners of the world. They believe, and rightly in my opinion, that one of the two English speaking partners cannot long remain prosperous if the other is improverished or is not helped to regain at least a sizable portion of its former economic strength.

This is not to say that America should withdraw from world markets and turn them over to Britain. That would be folly. In fact, it couldn't be done in actual practice because many buyers might turn elsewhere altogether. But assuredly there is an area in which America and Britain can work together to their mutual advantage. For our own selfish motives, aside from anything else, it is to our interest to have Britain a strong factor in the postwar world.

That brings me to another point. The economic problems facing both countries bear a remarkable resemblance to each other, though they admittedly differ in degree. Britain as well as America will have her hands full with questions of demobilization, reconversion, labor costs, full employment, and surpluses. These are live questions today here as well as at home. Industrialists in both countries have a tremendous and vital stake in the proper answers to these questions. The success of their business and of private enterprise itself hangs upon these answers.

What then would be more fitting, more desirable or more constructive than for the governments of the two nations to encourage the representatives of British and American industry to sit down round a table and discuss some of their mutual problems? By such means it may be possible to bring about a meeting of minds that will help allay some existing suspicious fears and rivalries, and that will assist in building a sound program of cooperation between Britain on the one hand and ourselves on the other.

There is much to be gained from cooperation. It is the kind of constructive action that will aid in achieving that unity of purpose and better understanding without which the peace will be merely another respite between wars.

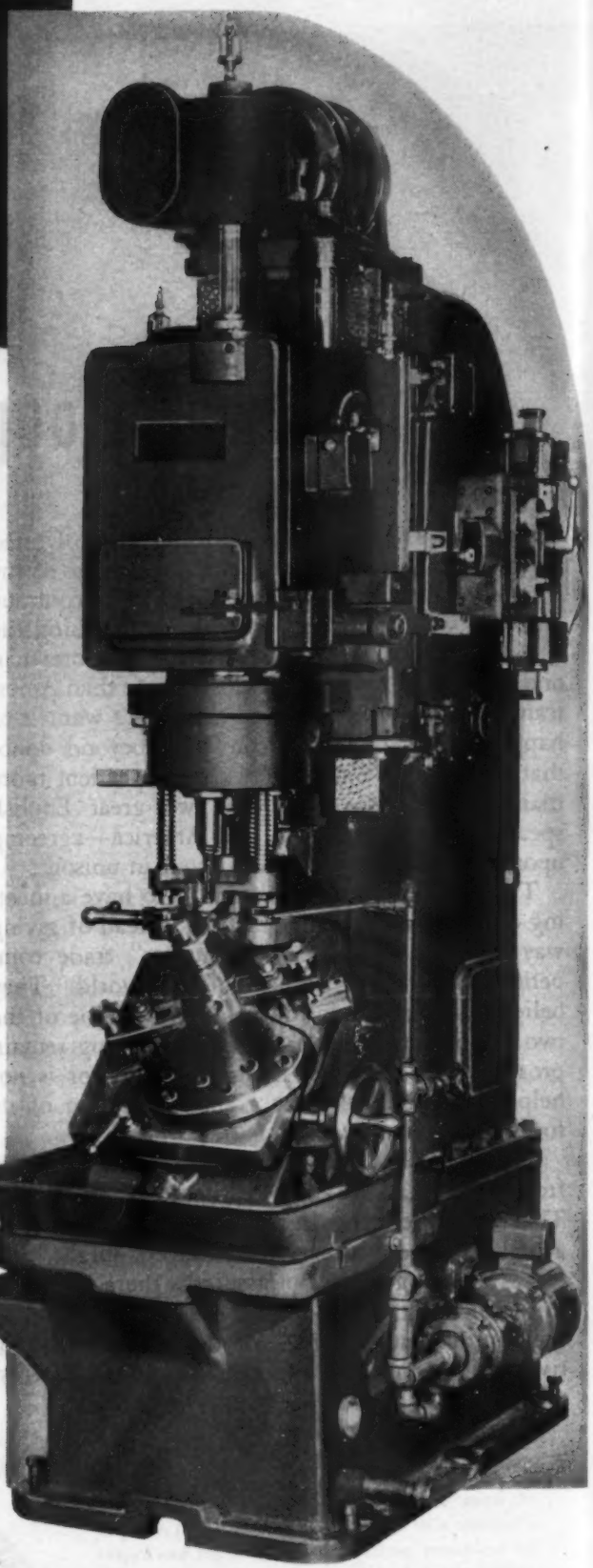
Burnham Finney

NOTE: Mr. Finney is in the United Kingdom as a guest of the British Government to view Britains war production efforts and to talk with British industrialists about postwar problems.

MORRIS

High Production

Vertical Drilling Machine

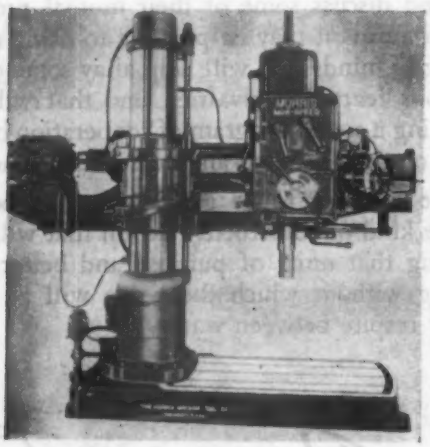


● Drilling-reaming-counterboring angle holes in the crankshaft shown, on a production basis, was the problem solved by the accompanying Morris Vertical Production Machine.

This machine features a hydraulic feed mechanism and a three station automatic indexing head. Note sturdy base and column construction insuring utmost rigidity.

It is also a typical example of the wide variety of special production machines designed, developed, and built by Morris for specific operations on work desired in quantity at low cost.

On your high production jobs requiring drilling-reaming-boring-counterboring and similar operations, consult Morris Engineers—they can help you.



Builders of MOR-SPEED Radials

The MORRIS *Machine Tool Co.*

CINCINNATI 3, OHIO

Fixtures Speed Welding of Magnesium Wing Tips

BY LESLIE M. BYARS, PRODUCTION ENGINEERING, NORTHROP AIRCRAFT, INC.

Well planned tooling aids in the working of sheet magnesium for Northrop's new night fighter

NORTHROP'S BLACK WIDOW P-61 night fighter, world's largest and most powerful pursuit plane, has an all welded sheet magnesium wing tip. Considerable tooling was necessary to give efficient operation and complete interchangeabilty of these parts.

The tips are made in halves from 0.050 in. thick sheet magnesium which has previously been formed and trimmed. In addition to these two main components, the welded assembly consists of four rib members, two doublers, which serve to reinforce access door openings, two bulkheads or cross braces, and two extruded angles of magnesium welded to the outer wing station line forming the attach angle.

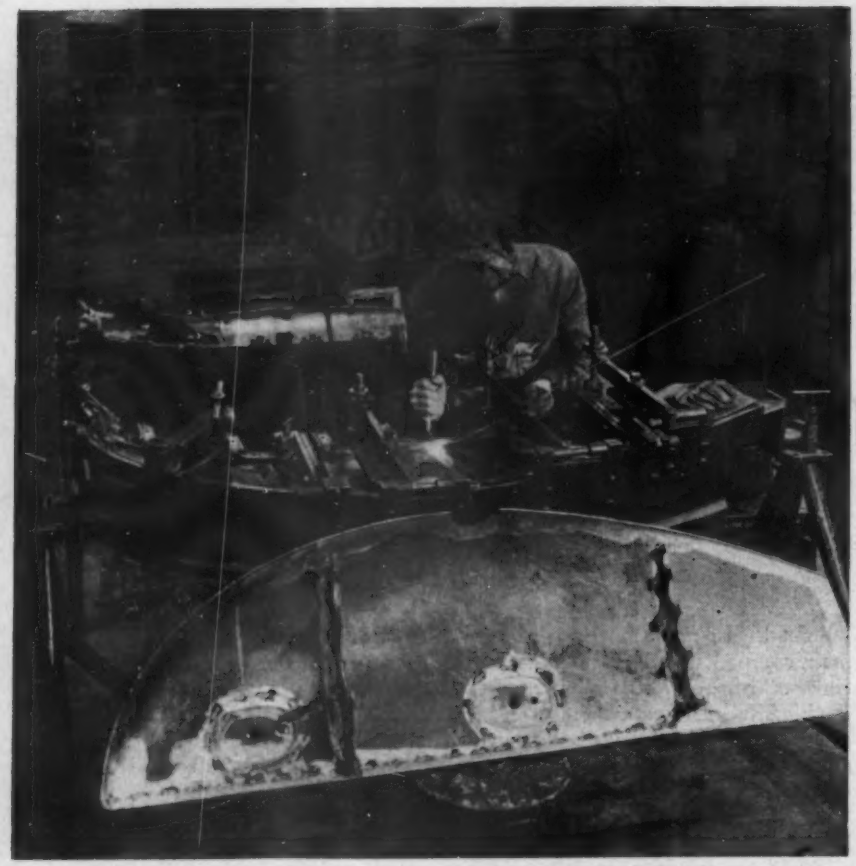
Welding is done by the Heliarc process in which a tungsten electrode is shielded by a stream of helium gas to prevent oxidation of the weld. Magnesium rod is fed into the arc and fused with the parent metal. This process is a Northrop development.

Tooling starts with a control master mock-up which coordinates all aerodynamic shapes and contours of the wing tip and is provided with bushings inserted at the attach points to insure correct coordinations to outer wing and the de-icer boot. The master establishes a uniformity in the various jigs throughout which the tips are processed. The use of such a master conforms to Northrop's standard method of tool control.

After forming, fabrication starts with the trim jigs with pneumatic cylinders to hold the router cage in position for routing. This is done by a hand router.

The two trimmed halves or skins,

After forming, rough cut magnesium wing tip halves are positioned by contour on a cast walnut-metal plastic base and indexed to the jig by two tooling holes punched in the part during the drop hammer operation. The tips are trimmed with hand routers in this set-up. The contoured pneumatic clamp on the front jig is down with the part ready for routing. The second jig has the clamp up, ready for the part. Trimmed parts are on the floor



The weld jig holds the parts for Heliarc welding of the wing rib halves and the doublers and to attach angles to the formed skin

Clamped-up wing tip halves are welded by the Heliarc torch which utilizes helium gas in welding magnesium assemblies

as they are called, are placed into a weld jig, which is cast of iron from a plaster form taken from the master, located in place by two tooling pins which are coordinated from the form die. These same pins are used in the trim jigs. The magnesium skins are held firmly against the jig surface by four large convex plates, also cast from the master and bolted in place. As in all magnesium welding, the parts must be held firmly to avoid distortion.

The extruded angle is then placed in the jig and locked securely by six cam-operated clamps. This angle has previously been formed to the shape of the airfoil where it connects with the outer wing assembly. The doublers for the access doors are also added in this jig. The doublers are of the same material as the skin, routed and formed to shape in the fabrication department, which are held in place by contoured plates bolted in place.

Two brackets hinged to one side of the jig are provided with slots into which the ribs are held, locating these members in correct relation to the other parts. These brackets swing over the assembly and are bolted in place.

Intermittent welds are used to join these parts as they give ample strength and are not visible from the outside of the tip. To assist the welder in spacing the intermittent welds, the jig is marked with red paint which indicates the length and location. With the parts thus clamped in place, the Heliarc torch is used to fuse them together. The jig is mounted on trunnions so it may be rotated to the best position for welding.

Two Halves Joined

The next fixture is called a sew-up jig, which joins the two halves. The halves are put into the jig vertically and are held against a central form by means of hinged clamping arms; these jig details are also cast from the master. The arms are provided with dimples which provide gripping points for clamps which lock them tightly together.

The base of the jig represents the wing station line, and the attach angles are held by a series of small cam-operated clamps with fingers that can be turned and pulled down over the flanges or angles which are now inside the wing tip.

The inner form of the jig is grooved

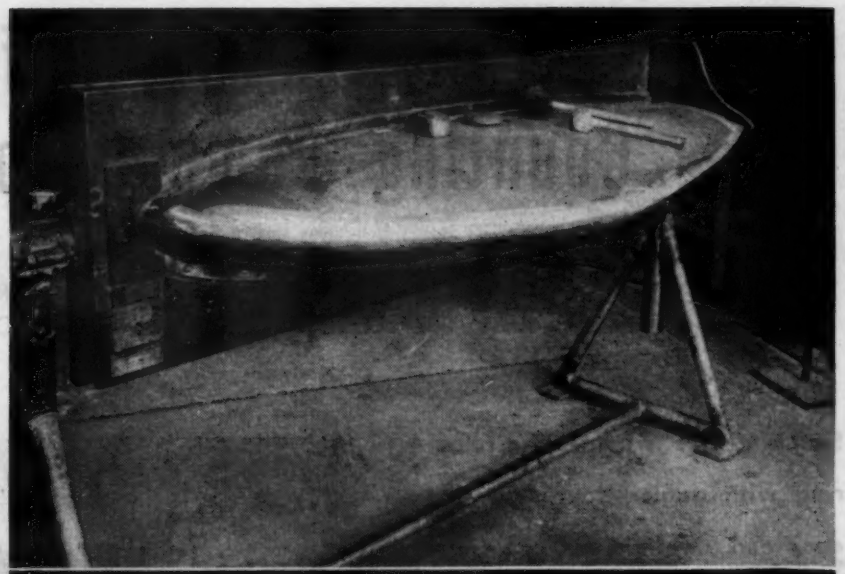
to allow for weld relief. The aft end of the tip is contoured to clear the aileron and is a separate detail part of 0.051-in. material the same as the skin. This part is clamped into this same set-up. The jig is pivoted vertical and counterbalanced so it can be easily moved to a convenient position for welding.

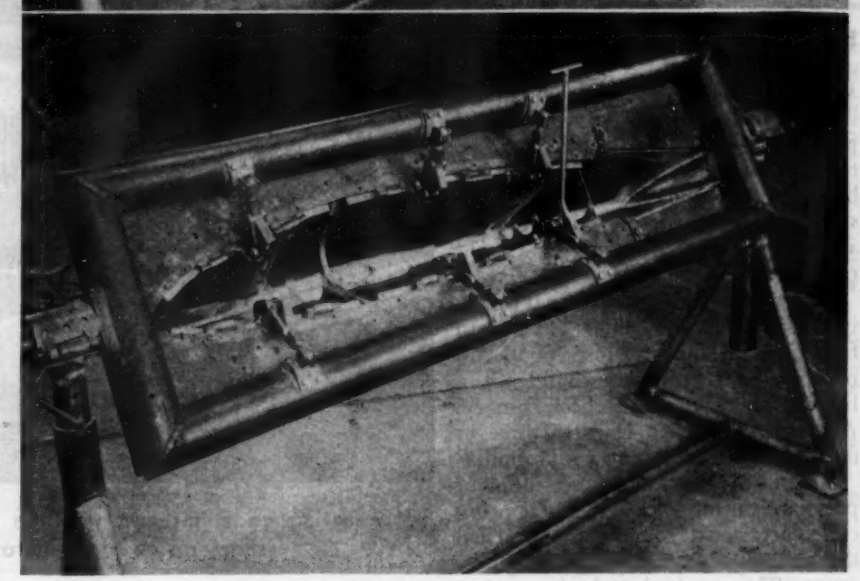
The jig is called a bumping jig, and is also used to weld the bulkheads into the tip. The most important use of this jig is to take out "cans" and reshape any distortion which may have been caused in welding. This is done by a metal finisher with the usual metal worker's tools and a torch used to heat the metal to a stage to which it is pliable. This jig is provided with heavy clamps with cant-level action to hold the wing tip in shape and also reshape it to the proper shape, if need be, with use of heat.

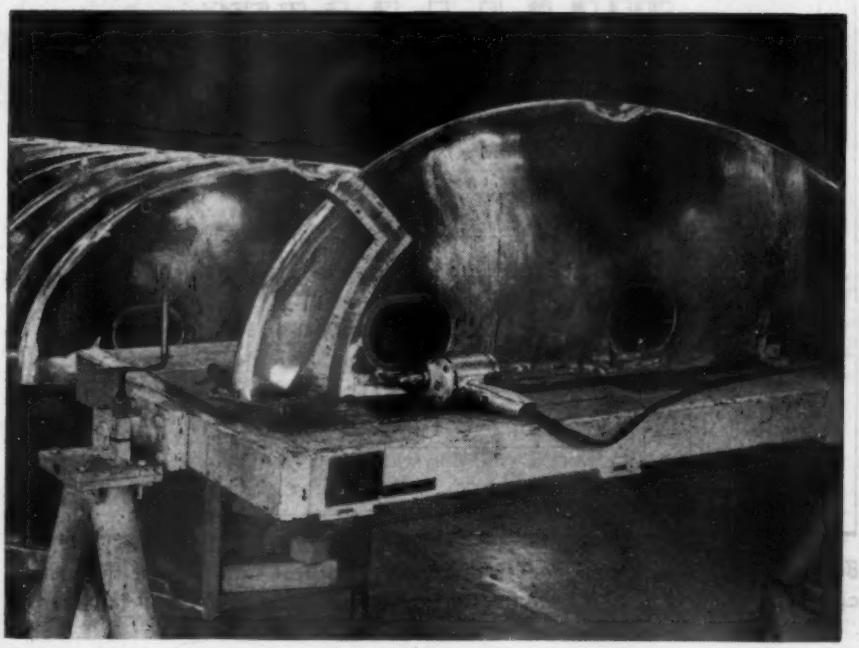
Tip Drilled in Last Jig

The last jig is the drill jig which also carries out the same set-up of holding the attach points in shape by means of heavy clamps. The yoke is held in place by a cam-action clamp. This drills the holes for the de-icer boot. Drill bushings are located in the base of the jig whereby the holes are drilled in the attach angle to coordinate without wing. This jig also mounted on trunnions and is rotated to any desired position.

The wing tips are buffed and finished, sent to the paint shop for processing, then to the electrical department for electrical installations after which they are ready for the ship.







Above—This gas-weld jig is also used as a finishing or "bumping" jig to hand form magnesium wing tips after the halves are welded together. Various hand tools are used to remove "cans" and irregularities in the magnesium assembly. A torch is employed for reheating stubborn areas difficult to pound into proper shape. Below—An inside view of the gas-weld, hand-forging jig shows the clamping devices for holding the part on the station line and the wing reference lines

Attach angles which fasten the magnesium wing tip to the outer wing are drilled in this drill jig. De-icer boot fairing strips are drilled by the jig saddle. Completed parts are shown in the immediate background. The drilling operator completes fabrication of the wing tip

Gage Devised for Counting Commutator Bars

BY J. I. KARASH, PLANT ENGINEER,
RELIANCE ELECTRIC AND ENGINEERING COMPANY

Simple device is made of a tube ring with gaging teeth cut on each end. Method for counting bars is fast and more accurate

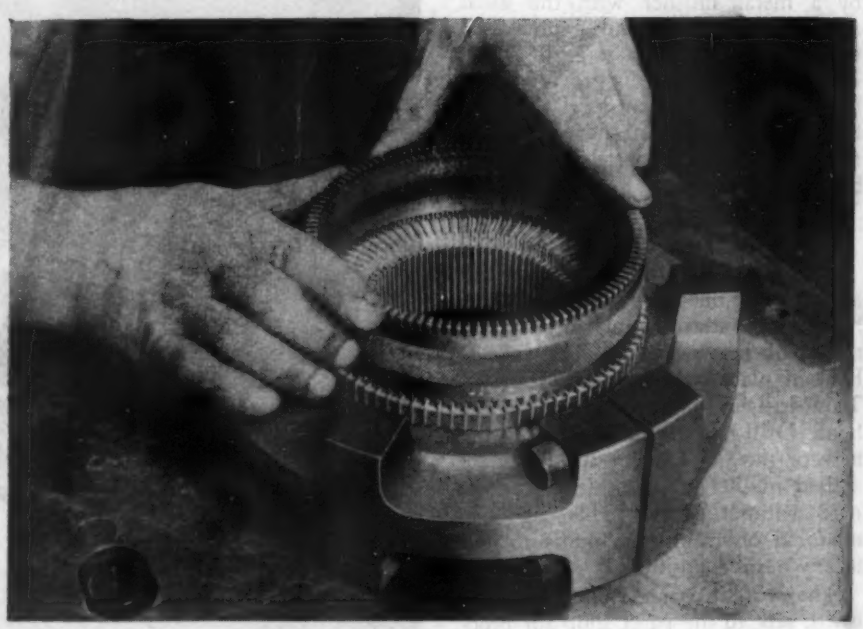
MANUAL COUNTING of commutator bars is one of the most tedious and painstaking operations in the manufacture of commutators. This problem has been met by the development of a simple gage which essentially counts all the bars simultaneously for a rapid right or wrong check.

Experience shows that manual counting is slow and unreliable. The human factor makes it easy to lose count, and no operator has complete confidence in his first count unless a recheck is made. A discrepancy often leads to three or more counts for accurate verification.

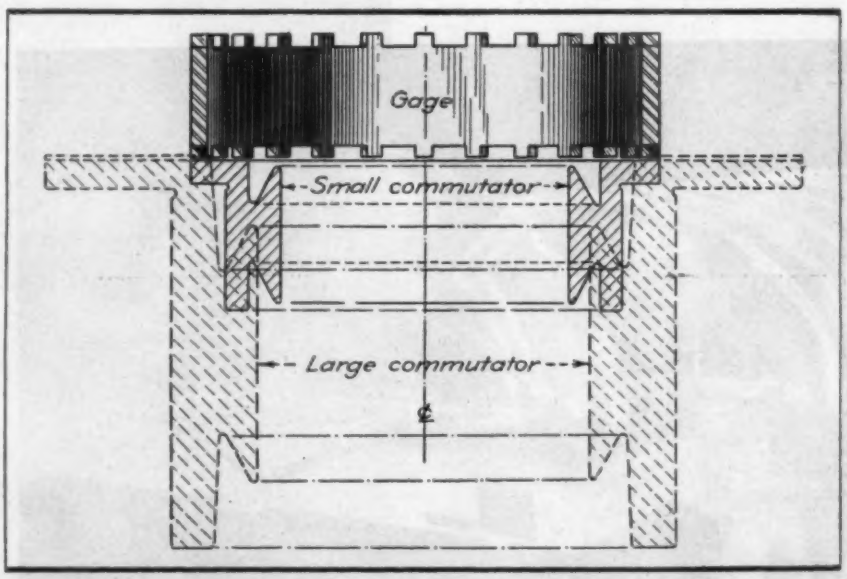
Despite checks by three different persons during the manufacturing cycle, occasional commutators reached the final operation stages with a miscount. This results in a high cost loss because the assembled commutator bars are bored to size and cannot be restacked and used. This is particularly aggravating where special commutators are involved because the bar materials are difficult to replace.

Various experiments were tried to utilize purchasable electrical and mechanical devices but they proved unsatisfactory. A device which properly counts 99 out of 100, or 999 out of 1,000 is unacceptable. The count checks must be accurate. Roughness and irregularity of sawed copper bars in the primary commutator operations prevent standard counting devices from functioning with the required unfailing perfection.

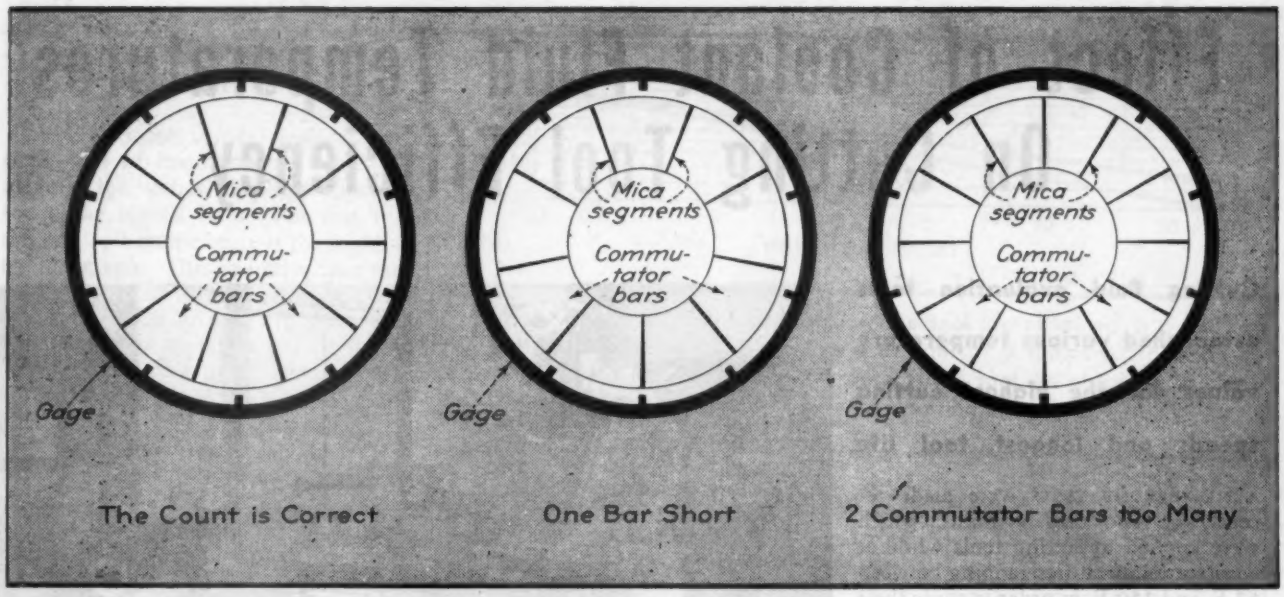
The gage which solves such counting problems involves principles which may be applicable to similar problems. It is a simple tube ring with gaging teeth cut on each end, thus utilizing each gage for two different counts. The two counts on each gage are radically different to eliminate confu-



Bar counting gage is shown with the teeth engaging the projecting mica segments on a commutator in a vertical plane



Bar counting gage is designed to engage the largest diameter of the small commutator, and thus it will fit the large commutator having the same bar count



Relation of gage to commutator when count is correct and incorrect is illustrated. The engaging teeth are made as thin as possible. There is no vernier gain or loss when count is correct. When there is one bar less than required on the commutator, the gage does not fit and its teeth gain on the bars in a clockwise vernier fashion. The number of bars off count can be determined readily. For example, the commutator in the sketch at right has two bars too many and it can be noted that the vernier fashion gain goes through two cycles

sion over which is the right end to use.

The gage teeth engage the projecting mica segments and thus establish unfailingly whether or not the bar count is correct. This counting gage is not limited to proving only that the commutator has the proper number of bars, but even if it was confined to just that it would still achieve its objective. Actually the gage can be used for either or both of these functions if the commutator bars are not too thin: To determine whether there are too few or too many bars; to determine the number of bars under or over the prescribed amount.

A single counting gage has a wide scope of sizes and commutator types. In the manufacture of electric motors there may be an infinite number of commutators which are similar in count but vary dimensionally in diameter, length or some detail dimension. To achieve maximum range of usage, the bar counting gage is designed to engage the largest diameter of the smallest commutator. It will then fit a large commutator having the same bar count.

The different counts encountered in commutators are not infinite, but generally follow a pattern based on the number of armature coils and the number of sections per coil, resulting in a limited number of different counts involved in an infinite dimensional variety of commutators.

Milling Cutter Economy

We read of milling steel at 1000 ft. per min. and better, and know this is being done in more than one shop. But there are two sides to the story, both of which must be considered by the shop manager who really wants to benefit by utilizing carbide cutters and the new developments in this line.

Few shops can fail to gain by studying modern milling practice and by adopting late practices in this field. But there are several points to be considered in determining the most economical speeds and feeds. All experiments indicate that the feed should be enough to remove an appreciable amount of metal at each tooth contact with the work. A scraping cut dulls the cutter more than a chip of from 0.003 to 0.010 in. per tooth. This makes the feed depend on the speed of the cutter and the number of teeth.

Cutter speed affects the number of contacts per minute between the cutter teeth and the work, and has a direct bearing on cutter life. So cutter speed must be selected to give a length of cutter life that will be economical from several points of view. These are: Frequency of changing cutters; time lost in making the change; time and cost of regrinding cutters and amount of carbide lost at each grind.

Some find that frequent grinding of the cutter is best because it saves time in grinding and wastes less carbide than when the dulling requires more time to recondition the cutter. Others run cutters after they show appreciable dulling because they still leave a satisfactory finish on the work.

Frequent grinding requires a number of cutters so that work can go on with only the time lost in making the change. Permitting greater dulling may enable the cutters to be used until the end of a work period, and so save idle time on the operation itself. All these conditions must be balanced against each other to determine which is best.

It frequently pays to run the cutters at a much slower speed than could be maintained for a few minutes in order to lengthen the life between grinds. Increasing the milling time by cutting down the cutter speed may be economical when we consider time lost in changing and reconditioning cutters.

There are many shops where cutter speeds can be materially increased with their present equipment. But in order to secure greatest net economy the factors of actual milling time, loss of time in regrinding and cost of cutters must be considered. Add to this the investment in cutters to enable them to be changed when necessary and so permit production while the dull cutters are being reground.

Effect of Coolant Fluid Temperatures On Cutting Tool Efficiency

Cutting fluid evaluation tests established various temperature values for the highest cutting speeds and longest tool life

A NUMBER OF TESTS were made recently on two coolant fluids, which were applied to cutting tools while at constant temperatures ranging between 55 F. and 150 F. in order to study their effect on tool life, cutting speeds, chip formation and other factors. One of the cutting fluids used was a sulphurized mineral oil and the other an emulsion of 1 part soluble oil and 20 parts water.

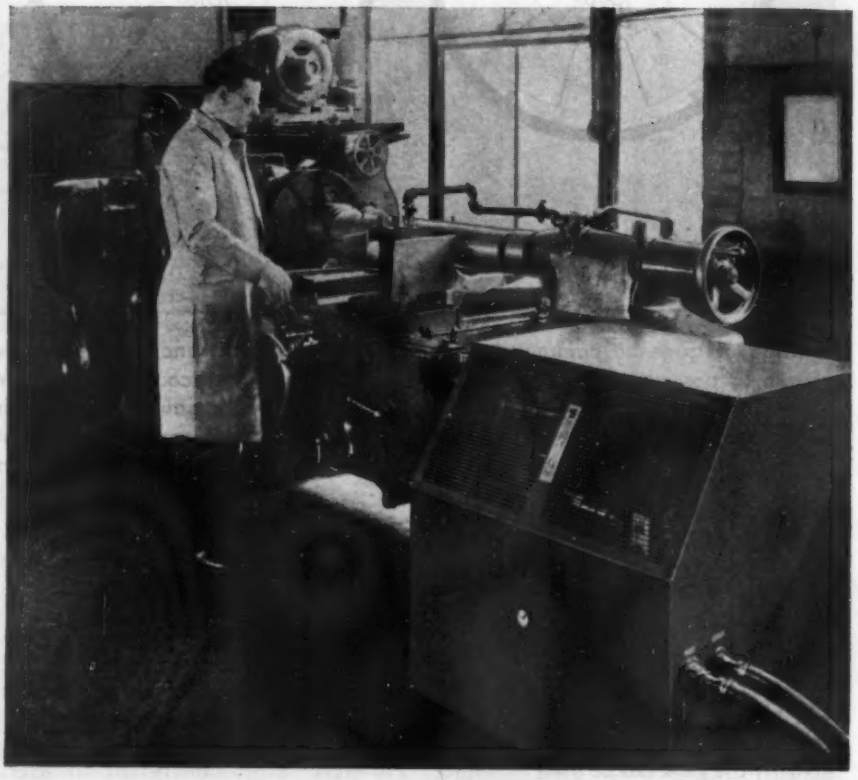


Fig. 1—A tool lathe and an industrial fluid cooler were set up for a cutting fluid evaluation test. The coolant was pumped to the cooling unit by the lathe pump and from the cooling unit to the point of application

Cutting Fluids

The first series of tests was run with the mineral oil. For each of the constant temperatures of the oil, a number of cutting-speed tool-life tests were run. Every third or fourth test was run dry at a given cutting speed of 135 f.p.m. to furnish a comparison with dry cutting and also to provide a means of checking the uniformity of the machinability of the test log throughout the tests.

The cutting oil consisted of a sulphochlorinated petroleum oil which had viscosities at the seven temperatures at which it was used, as follows:

55 F.—530 Saybolt
70 F.—320
85 F.—205
100 F.—145 Universal
115 F.—110
130 F.— 85
150 F.— 66 Seconds

The mineral oil is a mixture of a sulpho-chlorinated fatty oil base with a mid-continent neutral petroleum oil of approximately 0.6 percent sulphur and 0.5 percent chlorine.

Three or more tests were run with the oil at each of the seven temperatures, using a depth of cut of 0.100 in. and a feed of 0.0125 in. per revolution. These cuts were maintained in all tests.

The second series of tests was carried out with an emulsion, made by mixing 1 part of a standard soluble oil with 20 parts by volume of distilled water. Inasmuch as this liquid did not increase in viscosity at the lower temperatures, a temperature of 40 F. was added to the other seven.

An all-purpose industrial fluid cooler, shown in Fig. 1, was used in addition to the regular cutting fluid tank on the lathe on which the tests were run, so as to maintain the larger quantity of cutting fluid, 40 gallons in all, at a constant temperature for each series of tests. A discharge of cutting fluid on the tool of 5 gallons per minute was maintained.

Results of the Tests

In Fig. 2 ten circles are shown. Each circle represents the tool life obtained in a test run at its corresponding cutting speed. Somewhat erratic results were obtained, as indicated by the fact that all the points do not lie uniformly on the line. The equation of the line is shown in the table as part of Fig. 3. This had been determined previously to be $VT^n = C$, in which V is the cutting speed in f.p.m. at which the test was run, T is the resulting tool life in minutes as indicated by the complete breakdown of the tool, n represents the tangent of the angle of slope made between the line and the horizontal line of the graph sheet and C is a constant depending upon the tool material, tool shape, material cut, size of cut and cutting fluid. This line represents the performance of the cutting oil under these conditions in two ways —first, by its height or vertical displacement as indicated by C, which equals the cutting speed for a one-minute tool life, or by V_3, which is the cutting speed for a 3-minute tool life, or V_{30}, the cutting speed for a 30-min. tool life, or T_{135}, which is the tool life for a cutting speed of 135 f.p.m., etc.

This article is an abstract from a report on an engineering research project carried out for the Gray-Mills Company, by O. W. Boston, W. W. Gilbert and R. E. McKee, of the University of Michigan, Ann Arbor, Mich.

Values of V and T for any tool life or speed can be taken, depending upon the comparative information desired.

In Fig. 3 the vertical scale is five times that of the horizontal scale, to magnify the vertical displacements between the several lines. The line for the 70 F. oil temperature is the highest on the graph. This indicates that the cutting speed in this test is highest for any given value of tool life when the cutting fluid is maintained at 70 F.

The 85 F. line is next highest on the graph, probably indicating less cooling effect of the oil. For some reason the line for 55 F. is next in height. This is probably due to the fact that at this temperature the viscosity of the oil is 530SSU, which is too high to allow the oil to flow freely and act effectively as a coolant.

Figs. 4 and 5 summarize the data shown in the table of Fig. 3 and emphasize the value and relationship of the results. Fig. 4 shows viscosity of the oil at different temperatures plotted over the oil temperature as a solid line. The dashed line shows clearly how tool life is at a maximum of 11.2 min. at or slightly above 70 F., and is at the lowest value of 4.5 min. for the highest temperature of 150 F. It drops further to 3.99 min. for dry cutting.

Fig. 5 gives the summary lines representing V_3, V_{30}, n, and T_{135} plotted over the temperature of the oil. If V_3 for dry cutting is 142 f.p.m. and represents 100 percent, then the 158 f.p.m. for the 70 F. temperature is 111 percent. Also, if 99 f.p.m. is V_{30} for dry cutting and represents 100 percent, the 120 f.p.m. for 70 F. is 121 percent.

The values of *n*, which represent the slope of the lines in Fig. 2 are low (beneficial) for the low temperatures and high for the high temperatures. For commercial cutting speeds such as V_{480}, the cutting speed for an 8-hour tool life, the differences in cutting speeds would become much greater and be in favor of the lower coolant temperatures.

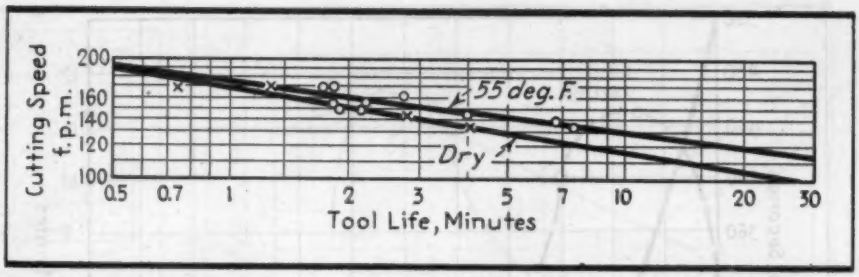


Fig. 2—The two lines of the graph show the tool life obtained in a test run with a sulphurized mineral oil used as a coolant at a temperature of 55 F., and when cutting dry. Each circle represents the tool life obtained in a test run and corresponding cutting speed

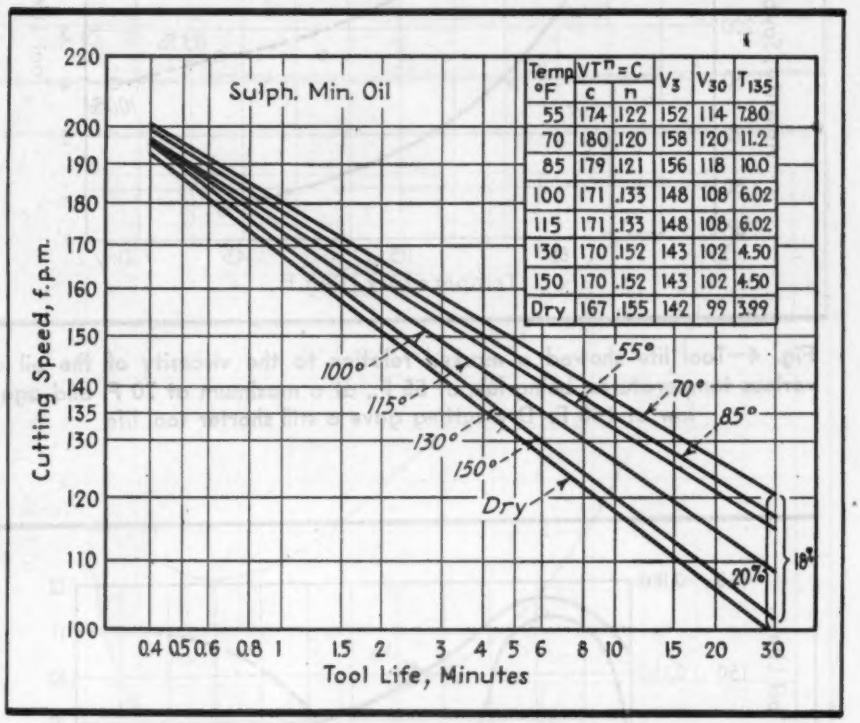


Fig. 3—Summary graph of eight cutting speed tool life lines when using sulphurized mineral oil at various temperatures. The cutting speed is shown to be highest for any given value of tool life when the cutting fluid is maintained at 70 F.

Tests With Emulsion

A second series of tests was carried out to observe the influence of an emulsion under the same conditions as those which applied to the oil and the results are shown in Fig. 6. The emulsion consisted of a commercial soluble oil mixed with 20 parts, by volume, of distilled water. The vertical scale of Fig. 6 is logarithmic, but elongated to equal five times that of the horizontal scale to emphasize the vertical displacements.

In Fig. 6 the line for dry cutting is shown to be the lowest and steepest. Corresponding values for the emulsion at each of the eight temperatures are also shown.

The line for the 40 F. temperature is highest for all cutting speeds above 150 f.p.m., but due to its steeper slope, it does not perform so well at lower speeds. At this low temperature the material cut was thoroughly chilled and this may have made it more difficult to machine. The lines for the higher temperatures are shown to have the greatest slope, while the lines for the 55 and 70 F. temperatures have the lowest slope. Low value of slope accompanied by high vertical placement on the chart represent the most favorable metal-cutting conditions.

Values of T_{135}, tool-life, for a speed of 135 f.p.m. for the emulsion, are shown plotted as circles in Fig. 7. The smooth solid line represents a mean average. The short dashed line at the right simply connects the solid line with the value of T_{135} for dry cutting. The long dashed curve represents corresponding values for the oil, as brought forward from Fig. 4 for the sake of comparison. These two curves clearly show that the cooling effect of the emulsion is greater than that for the oil, for all temperatures above 85 F. From these average curves, it appears that the oil is superior to the emulsion for temperatures between 60 F. and 85 F. For temperatures below 60 F. the emulsion appears superior because of the extremely high viscosity of the oil at these low temperatures.

Values of *n* (slope) are shown plotted as circles for the emulsion in Fig. 8. The values of slope for the

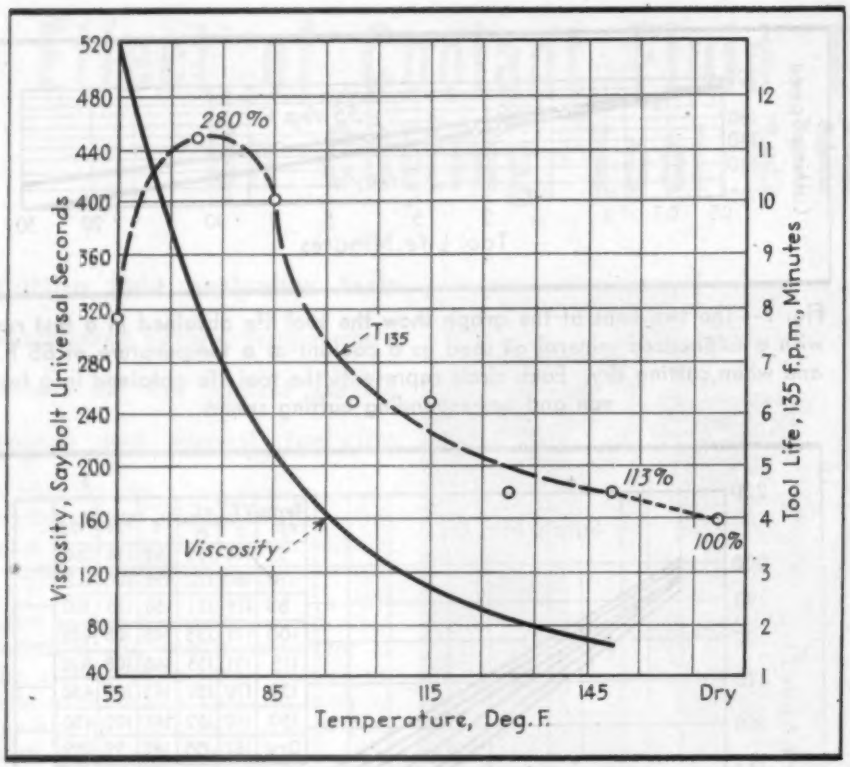


Fig. 4—Tool life showed a marked relation to the viscosity of the oil at various temperatures, being low at 55 F., at a maximum at 70 F. and again low at 150 F. Dry cutting gave a still shorter tool life

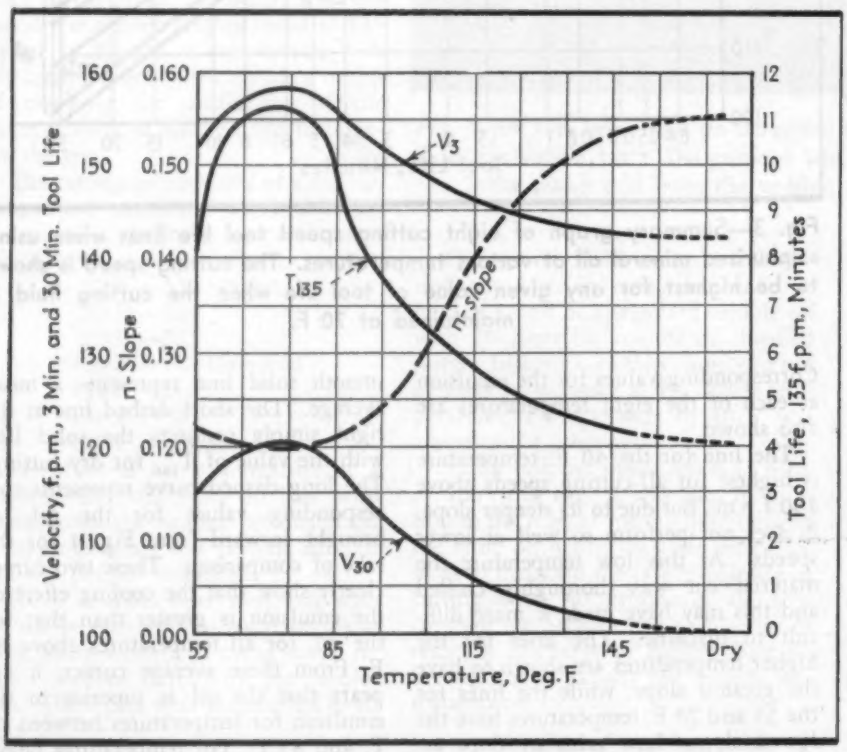


Fig. 5—Cooling of cutting fluids had beneficial effects by lengthening the life of tools and indicated that further improvement may possibly be made in commercial cutting operations by the use of cutting-fluids at the lower temperatures

lines for the temperatures of 85 F. and 100 F. seem excessively high, while that for the 115 F. line is low, with respect to the solid line which is drawn to represent an average. The light dashed line in Fig. 8 again shows the values of *n* for the oil as brought forward from Fig. 4 for comparison.

Heat Color of Chips

The first chip coming from the tool point in the tests on the emulsion at each of the various temperatures gives an indication of the effect of temperature control of the emulsion in relation to heat transfer at the cutting edge of the single-point tool. During the tests using the emulsion, observations were made as follows:

Temperature of Emulsion	Oxide Color of Chip	Approximate F.
40 F.	Natural	400 F. or below
55 F.	Light Straw	440 F.
70 F.	Med. Straw	460 F.
85 F.	Dark Straw	490 F.
100 F.	Purple	540 F.
115 F.	Purple	540 F.
130 F.	Blue	580 F.
150 F.	Blue	580 F.
Dry	Blue	580 F.

These data indicate that emulsions kept at the lower temperatures give more cooling effect on the chip and those at the higher temperatures allow more heat at the tool point, thus causing shorter tool life and more tool grinds per piece.

Material Cut

The material cut in these tests was an SAE 3140 annealed steel originally in the form of a forging 4 ft. long and 12 in. in diameter.

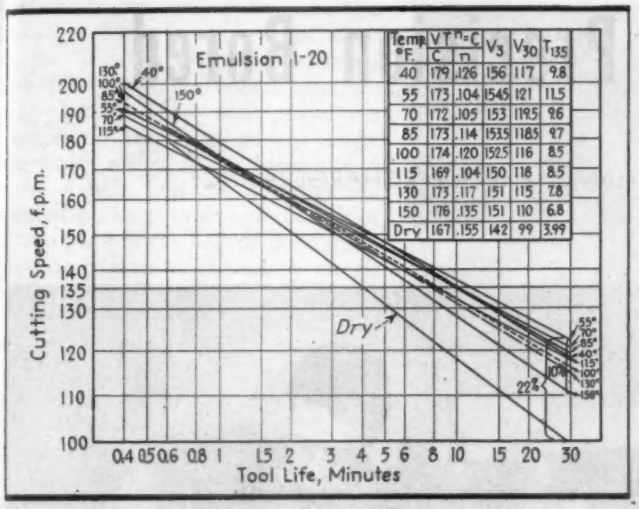
The sclerescope hardness was 24 to 26 and the Brinell hardness was 207. A tensile specimen taken at a radius of 4 in. showed the following physical properties:

Ultimate Strength, 105600 psi
Yield Point 60300 psi
Reduction in area of 46.5 percent
Elongation of 23 percent in 2 in.

The steel forging was mounted in a 30-in. swing engine lathe, being chucked at the spindle end and mounted on a live center in the tail stock. The 12-speed geared-head lathe was driven by an a.c. motor, through a mechanical variable-speed drive unit, so that desired cutting speeds could be maintained as the diameter of the work was reduced by machining.

Cutting Tools

The toolbits used were $\frac{3}{8}$ in. square by $3\frac{1}{2}$ in. long of Red Cut Superior 18-4-1, high-speed steel, ground to the shape of 8 deg. back rake, 14 deg. side rake, 6 deg. end relief, 6 deg. side



Temp. °F.	$VT^{n}=C$ C	n	V_3	V_{30}	T_{135}
40	179	.126	156	117	9.8
55	173	.104	1545	121	11.5
70	172	.105	153	1195	9.6
85	173	.114	1535	1185	9.7
100	174	.120	1525	116	8.5
115	169	.104	150	118	8.5
130	173	.117	151	115	7.8
150	176	.135	151	110	6.8
Dry	167	.155	142	99	3.99

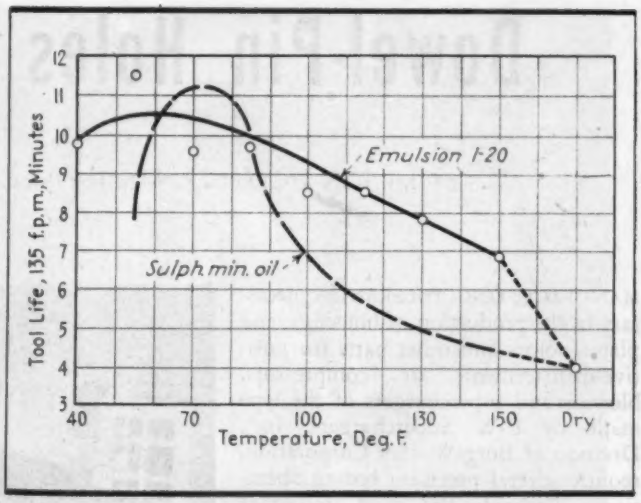


Fig. 6—Somewhat longer tool life was obtained by use of the emulsion when cooled to 40 F., as compared with dry grinding. It was also found to be highly efficient at this temperature for all cutting speeds above 150 f.p.m., but was less efficient at the lower speeds, possibly due to chilling of the metal

Fig. 7—The cooling effect of a 1-20 emulsion is greater than oil at a cutting speed of 135 f.p.m. at all temperatures above 85 F., while oil is superior to emulsion as a coolant at temperatures between 60 F. and 85 F. Below 60 F. the emulsion is superior because of the extremely high viscosity of the oil at low temperatures

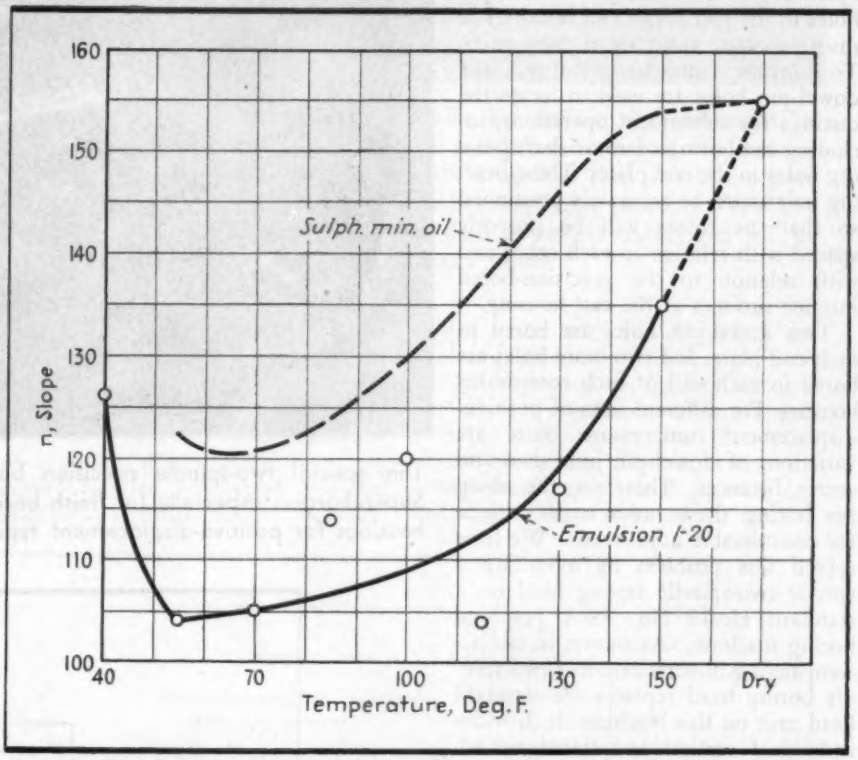


Fig. 8—The values of the 1-20 emulsion, compared with those of oil, are indicated as being somewhat similar, although the emulsion shows a more beneficial effect than oil on tool life when used at the lower cutting-fluid temperatures

●

relief, 6 deg. end cutting edge angle, 15 deg. side cutting edge angle and 3/64 in. nose radius. This tool is designated an 8-14-6-6-6-15-3/64. It was held in a solid block toolholder approximately 1½ in. wide, 2⅝ in. high and 4 in. long.

Rapid Softening of Plastic Preforms

IN A RECENT demonstration of high-frequency induction heating equipment, a plastic preform about 5 in. in diameter by 1½ in. thick was heated to a doughy consistency within 35 sec. In other words, by placing the "biscuit" in a high-frequency field of the order of 15,000,000 cycles per second, the entire mass was heated uniformly to proper plasticity for the molding operation. Thus, the preform was put into condition for molding before the thermo-setting action could take place.

High-frequency heating has the peculiar property of heating the material from inside out. Explanation advanced is that the particles are constantly reversed in step with the changes in polarity of the field, and thereby internal friction quickly raises the temperature of the object.

Many other applications of "diathermic" heating are coming into being. Chief war application is perhaps the bonding of plywood with glues or special cements. In the future, fabrics will be dried more rapidly, the speed of printing will be increased, because inks can be dried faster.

Dowel-Pin Holes Precision Bored

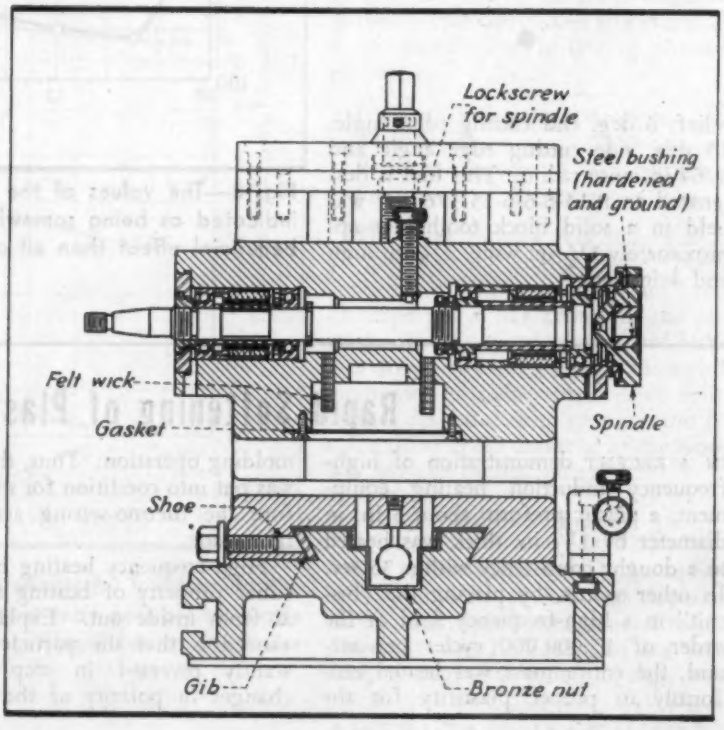
BY MILTON HOEPPNER, MASTER MECHANIC, B-W SUPERCHARGERS, INC.

MANUFACTURING TOLERANCES necessary in the production of housings, end plates, rotors and other parts for positive-displacement air compressors, blowers and superchargers of the type made by B-W Superchargers, Inc., Division of Borg-Warner Corporation, require several precision boring operations. Probably the most important operation is the boring of dowel-pin holes in the end plates and housings to insure accurate assembly of these parts. To insure interchangeability, the dowel-pin holes are used to locate the castings for subsequent operations, including the boring of rotor shaft bearing holes in the end plates. These bearing holes must be accurately positioned so that the rotors will be properly spaced with relation to each other and with relation to the precision-bored interior surfaces of the cast housing.

Two dowel-pin holes are bored in each end plate, and two more holes are bored in each end of each compressor housing. For different sizes of positive-displacement compressors, there are variations of dowel-pin hole sizes and center distances. Therefore, the set-up for boring these holes must provide for considerable adjustment. We have solved this problem by mounting a special two-spindle boring head on a standard Heald No. 48-A precision boring machine. As shown in the accompanying illustrations, this two-spindle boring head replaces the standard head unit on this machine. It provides individual vertical and transverse adjustment for each spindle so that any desired combination of spindle height and center distance can be obtained. In addition, dial indicators are built into the unit to facilitate accurate adjusment of the spindle to the proper position for a given set-up. This unit has made it possible to finish bore dowel-pin holes more accurately than the fixed-position, two-spindle heads previously employed.

The work-holding fixture on this machine is designed to support and

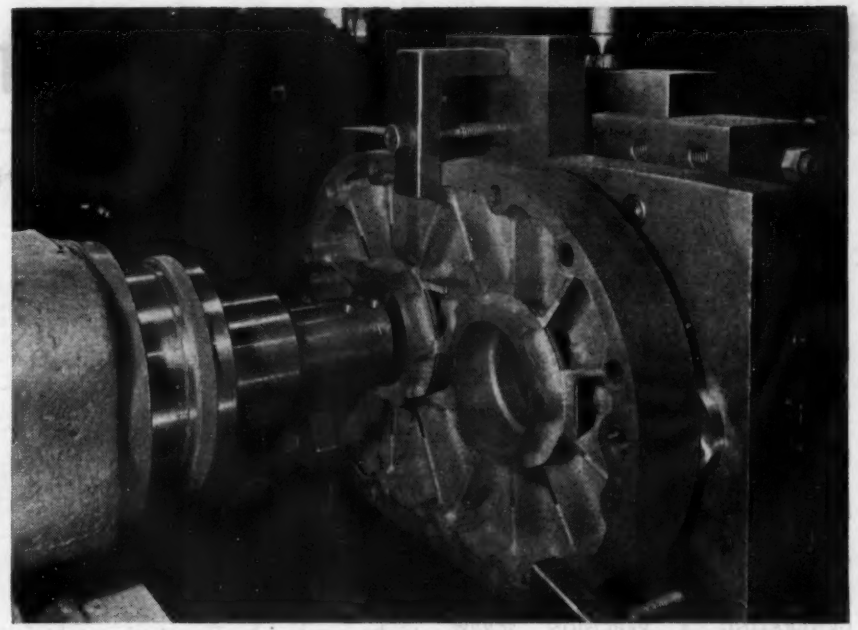
This special two-spindle precision boring head was developed by B-W Superchargers especially for finish boring dowel-pin holes in end plates and housings for positive-displacement type air compressors and superchargers.



The special two-spindle precision boring head shown above is designed for mounting on a Heald No. 48-A boring machine in place of the standard head unit. It is used for finish boring dowel-pin holes in compressor end plates and housings

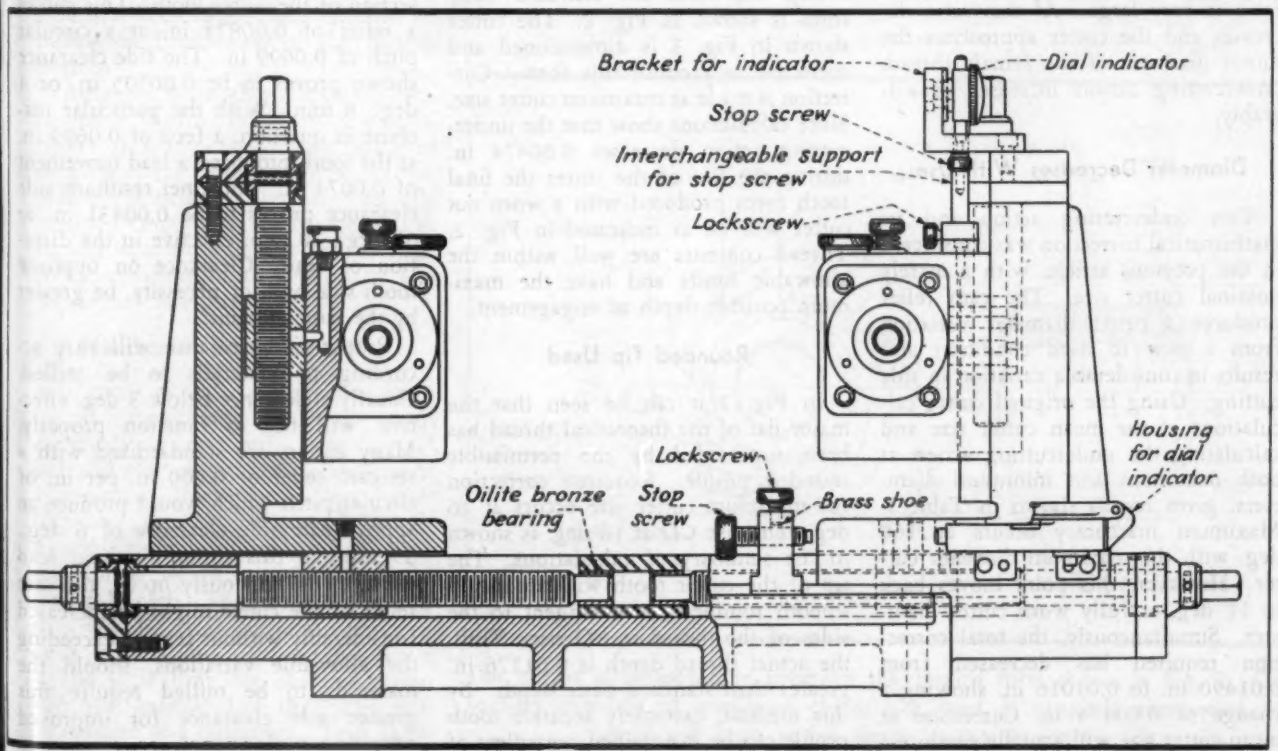
locate both the end plates and the mountings for a given size of compressor. Fixture plates are changed when parts for other compressors are to be bored. The end plates are mounted on the front of the angle plate which makes up the forward end of the fixture, and the housings are mounted between this angle plate and a clamp plate at the rear of the fixture. This clamp plate is moved by an air cylinder for clamping and holding the housing casting in position when the dowel-pin holes are bored.

Single-spindle Heald No. 48-A precision boring machines are used for rough and finish boring the rotor bearing holes in the end plates. The fixture used for this operation has an angle plate with pins which locate the work from the previously finished dowel holes and the base of the fixture contains a positive-stop arrangement to insure boring the two bearing holes at the correct center distance. This positive-stop unit for transverse movement of the fixture has a "cartridge" which is exchanged for another of a different length when the center distance between the bearing holes is changed. Like the two-spindle adjustable boring head unit already described, this fixture incorporates built-in dial indicators for accurate positioning of the fixture plate with relation to the positive stop unit in the base of the fixture. If, for example, it is found when setting-up for a new size of end plate that an adjustment must be made to bring the center of one of the bearing holes into correct relation with the dowel holes, the face plate of the fixture can be moved vertically or transversely with relation to the base of the fixture according to readings on the already positioned dial indicators. The center of each bearing hole must be within 0.001 in. of its specified location with respect to the dowel holes and this tolerance is maintained easily with the adjustable fixture employed.



The fixture on this precision boring machine has built-in dial indicators for accurate adjustment of the faceplate to bring the centers of the bearing holes to be bored into correct relation with a positive stop unit in the base of the fixture. This insures that the rotor-bearing holes bored in these end plates will be in line with previously finished dowel-pin holes, and will be the correct distance apart

Carbide-tipped boring bits are used for all of the precision boring operations on compressor parts. For most of the operations, the boring bars are mounted in heads which provide for micrometer adjustment of the bit.



High Speeds and Few Teeth

BY ROGER W. BOLZ, NATIONAL CARBON COMPANY

Multiple Thread Milling Cutters—II

Cutters should be designed so number of teeth permit maximum feed. Abrasive action and heat will be reduced and add to service life of thread mills

GENERATING A PRECISION SCREW THREAD by means of a thread mill involves for the most part a very minor amount of thread form variations other than those resulting from machine condition, machine arbors, or cutter grinding. Unlike other methods which might be used, the mill being essentially a topping cutter, always produces a thread of exactly identical depth so long as the original tooth rake angle is accurately maintained in regrinding the cutter.

However, this is not so with the thread width at the pitch line, which varies according to undercutting action of the cutter. This undercutting action is slight when the cutter to thread size ratio is very large. As this ratio decreases and the cutter approaches the minor diameter of the female thread, undercutting action increases considerably.

Diameter Decreases With Use

This undercutting action and its mathematical correction was considered in the previous article, with a merely nominal cutter size. The cam relief produces a cutter diameter variation from a new to used condition and results in considerable variation in side cutting. Using the original cutter calculations at the mean cutter size and calculating the undercutting action at both maximum and minimum diameters, gives results shown in Table I. Maximum inaccuracy occurs at 160 deg. with the maximum diameter cutter. However, this point moves back to 11 deg. at fully worn cutter diameter. Simultaneously, the total correction required has decreased from 0.01490 in. to 0.01016 in. showing a change of 0.00474 in. Correction at mean cutter size will actually produce a maximum inaccuracy of 0.0027 in. On ordinary general purpose work this correction should be of sufficient accuracy to satisfy most conditions.

Thread Design Must Be Considered

To consider the milling of an extremely accurate thread such as class 3 or 4, calculation must consider the theoretical design of the screw thread to be produced. Fig. 1 shows basic characteristics of the 3 pitch American National Standard thread form under consideration. Maximum accuracy of form in this female thread may be attained by maintaining as closely as possible the basic thread dimensions. The variable effecting this will be the change in thread form produced by the undercutitng variations in the cutter between new and used size. Table I shows this to be 0.00474 in. at the 0.125 in. cam relief used on the cutter.

Fig. 1 illustrates the standard thread form tolerances for a 3 pitch American National Standard Thread. The cutter-produced thread form which most nearly duplicates the standard basic form is shown in Fig. 2. The cutter shown in Fig. 3 is dimensioned and corrected to produce this form. Correction is made at maximum cutter size. Since calculations show that the undercutting action decreases 0.00474 in. during the life of the cutter the final tooth form produced with a worn out cutter will be as indicated in Fig. 2. Thread contours are well within the allowable limits and have the maximum possible depth of engagement.

Rounded Tip Used

In Fig. 2 it can be seen that the major flat of the theoretical thread has been superseded by the permissible rounded profile. Required correction for maximum cutter size occurs at 16 deg. The rise *CD* at 16 deg. is shown in the summary of calculations. The tip of the cutter tooth will produce a smooth rounded curve tangent to the sides of the thread at *CD* rise. Thus, the actual thread depth is 0.01276 in. greater than standard basic depth. By this method, extremely accurate tooth profile can be maintained regardless of correction requirements of any cutter. It can be seen from Figs. 1 and 2 that a considerably wider diameter variation might be used on the cutter without exceeding allowable form variations. However, should a closer tolerance on form be necessary, the total difference from new to used diameters may be reduced. This may be done by reducing cam relief if possible, or by a reduction in the usable length of the cutter tooth.

Watch Side Clearance

As a general rule it is not advisable to reduce came relief without reducing the length of tooth. Although the cam or peripheral clearance is sufficient for the material to be milled, the side clearance of the tooth in the milled path may be far too small. Fig. 4 illustrates conditions involved. Using a set cam relief of 0.125 in. per in. of circular pitch, the actual side clearance of the cutter tooth in its path is approximately 4 deg., 8 min. This was found from the cam relief at a 1-deg. section of the cutter tooth. This shows a relief of 0.00874 in. at a circular pitch of 0.0699 in. The side clearance shown proves to be 0.00505 in. or 4 deg., 8 min. With the particular machine in question, a feed of 0.0699 in. at the tooth produced a lead movement of 0.0074 in. Thus, net resultant side clearance proves to be 0.00431 in. or 30 deg., 30 min. effective in the direction of lead. Clearance on opposite tooth side will, of necessity, be greater by the same amount.

Proper side clearance will vary according to materials to be milled. Usually a clearance below 3 deg. effective, will fail to function properly. Many cutters are standardized with a set cam relief of 0.200 in. per in. of circular pitch which would produce an approximate side clearance of 6 deg., 35 min. in this cutter (without lead effect). As previously noted, the cam relief of the cutter might be increased considerably without fear of exceeding the allowable variations, should the materials to be milled require this greater side clearance for improved operating performance.

Add to Cutter Life and Accuracy

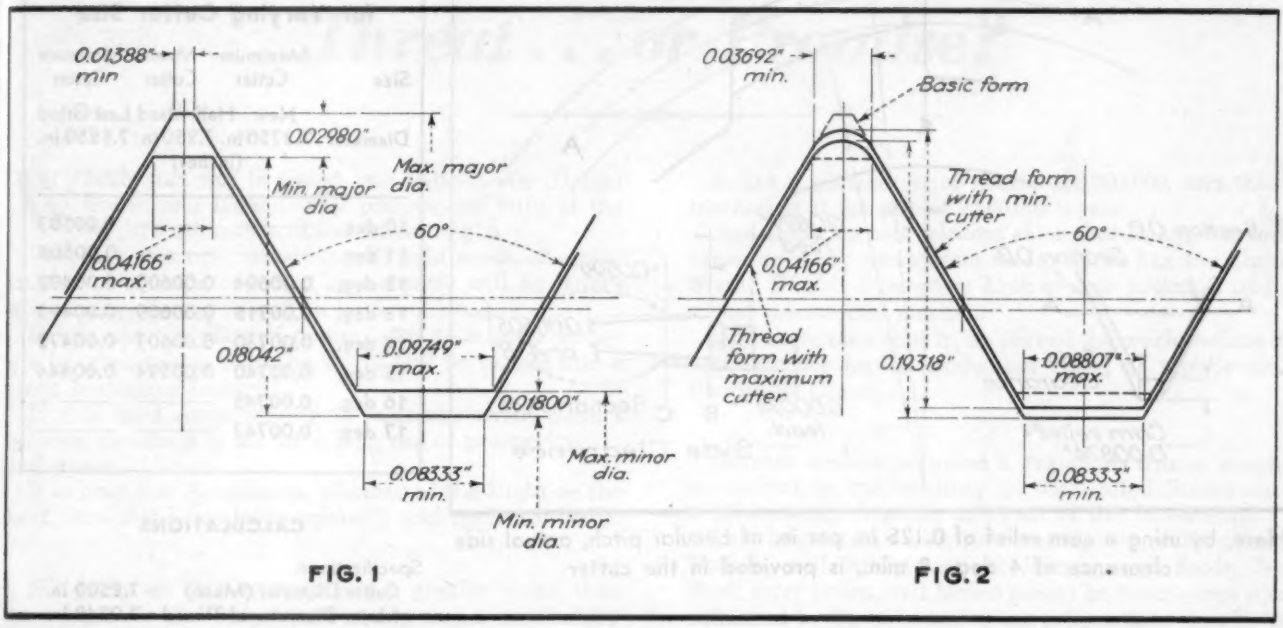


Fig. 1—shows basic dimensions and tolerances of a 3 pitch, class 3, American National thread. This is compared, Fig. 2—with the thread profile maintained by a corrected cutter at its worn out size

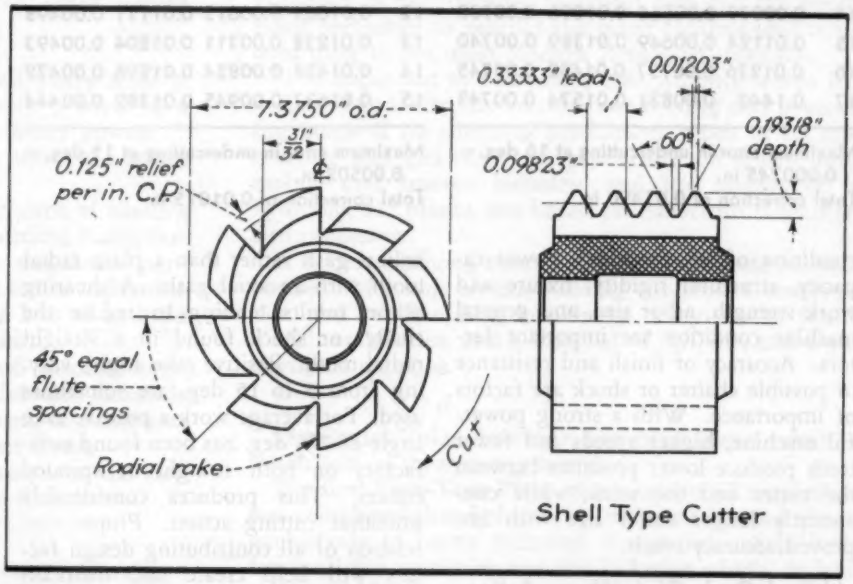
The operating performance of any cutter is greatly dependent upon the so-called "digging ability" of the teeth. Should the peripheral and side clearance be too small, the cutting edges will tend to ride the material until sufficient pressure is generated between the cutting edge and the material to start a chip. Simultaneously, considerable heat is created by this friction, resulting in breakdown of the cutting edge.

Abrasion is another important performance factor in many materials. Again, in many cases, excess riding or slipping of the cutting edge takes place before sufficient pressure actually creates a chip. This has been found to rapidly wear away the keen edge of the cutter, resulting in an abnormally low production rate per grind.

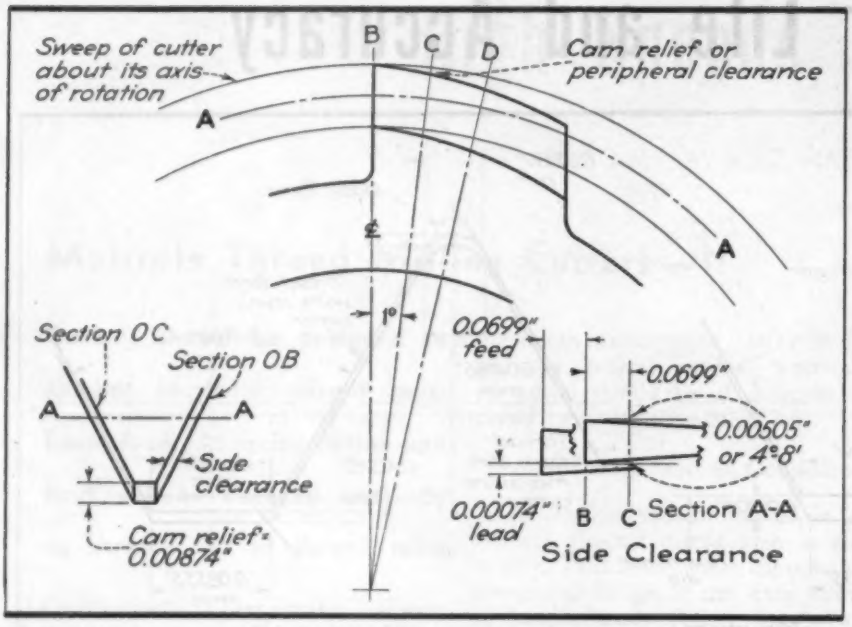
Number of Teeth Important

In order to allow a reasonable tooth length for economical cutter life on an extremely accurate cutter, the cam relief and side clearance may well be at a minimum. Nevertheless, good performance can be guaranteed by designing the proper number of teeth into the cutter to produce maximum feed per tooth. The maximum size of chip will be most efficiently removed by a modern milling machine, while at the same time the abrasive action and heat generated in the cutter will be reduced to a minimum. Tests show production per grind and quality of finish improve surprisingly as the chip thickness or feed per tooth approach the optimum maximum by using the fewest number of teeth possible in the cutter. Repetitive size accuracy showed distinct improvement with pitch diameter variations decreased to an insignificant amount between grinds.

In using the fewest teeth possible on cutters for a specific machine, digging ability or "bite" of the cutter into the work reaches its maximum. Prevailing pressures between the work and cutter are at a minimum and actual power input decreases directly with the number of teeth. However, maximum chip thickness must take into account the



This cutter is corrected to produce the thread form shown in Fig. 2. Correction is made at maximum cutter size, and, if properly sharpened, the tool will keep within limits during its entire life



Here, by using a cam relief of 0.125 in. per in. of circular pitch, actual side clearance of 4 deg., 8 min., is provided in the cutter

CALCULATIONS

Specifications:
Cutter Diameter (Maximum) = 7.3750 in.
Major Diameter of Thread = 7.9848 in.
Thread Form = 3 Pitch American National Standard

In Fig. 5:
AD = 3.9924 in. BC = 3.6875 in.
CD = AD-AC AB = 0.3049 in.
Y = CD tan 30 deg.

X	CD	Y	L	E
12	0.00723	0.00417	0.01111	0.00694
13	0.00846	0.00489	0.01204	0.00715
14	0.00979	0.00566	0.01296	0.00730
15	0.01124	0.00649	0.01389	0.00740
16	0.01276	0.00737	0.01482	0.00745
17	0.1440	0.00831	0.01574	0.00743

Maximum error in undercutting at 16 deg. = 0.000745 in.
Total correction of 0.01490 in.

CALCULATIONS

Specifications:
Cutter Diameter (Minimum) = 7.1250 in.
Major Diameter of Thread = 7.9848 in.
Thread Form = 3 Pitch American National Standard

In Fig. 5:
AD = 3.9924 in. BC = 3.5626 in.
CD = AD-AC AB = 0.4299 in.
Y = CD tan 30 deg.

X	CD	Y	L	E
10	0.00731	0.00422	0.00925	0.00503
11	0.00886	0.00511	0.01019	0.00508
12	0.01061	0.00613	0.01111	0.00498
13	0.01232	0.00711	0.01204	0.00493
14	0.01428	0.00824	0.01296	0.00472
15	0.01637	0.00945	0.01389	0.00444

Maximum error in undercutting at 11 deg. = 0.00508 in.
Total correction of 0.01015 in

condition of the machine. Power capacity, structural rigidity, fixture and work strength, arbor size, and general machine condition are important factors. Accuracy of finish and resistance to possible chatter or shock are factors of importance. With a strong powerful machine, higher speeds and fewer teeth produce lower pressures between the cutter and the work, while consistently longer cutter life with improved accuracy result.

Helical Gash Gives Shear Action

Improvement in the action at the leading edge of the cutter is often obtained by using a rake tooth and a helical gash rather than a plain radial tooth with an axial gash. A shearing action results tending to reduce the chatter or shock found in a straight radial tooth. Positive rake angles varying from 5 to 15 deg. are sometimes used. For average work a positive rake angle of 7½ deg. has been found satisfactory on both straight or spiraled cutters. This produces considerably smoother cutting action. Proper correlation of all contributing design factors will help create and maintain economical cutter operation. Economy and accuracy can thus be attained with smooth action and fine finish at the highest possible speeds.

TABLE I

Values of E for Varying Cutter Size

Size	Maximum Cutter	Mean Cutter	Minimum Cutter
Diameter	New 7.3750 in.	Half Used 7.250 in.	Last Grind 7.1250 in.
	(inches)		
10 deg.	———	———	0.00503
11 deg.	———	———	0.00508
12 deg.	0.00694	0.00600	0.00498
13 deg.	0.00715	0.00609	0.00493
14 deg.	0.00730	0.00607	0.00472
15 deg.	0.00740	0.00594	0.00444
16 deg.	0.00745	———	———
17 deg.	0.00743	———	———

CALCULATIONS

Specifications:
Cutter Diameter (Mean) = 7.2500 in.
Major Diameter of Thread = 7.9848 in.
Thread Form = 3 Pitch American National Standard

In Fig. 5:
AD = 3.9924 in. BC = 3.6250 in.
CD = AD-AC AB = 0.3674 in.
Y = CD tan 30 deg.

X	CD	Y	L	E
5	0.00141	0.00081	0.00463	0.00382
6	0.00218	0.00126	0.11566	0.00430
8	0.00390	0.00225	0.00741	0.00516
10	0.00613	0.00354	0.00925	0.00571
12	0.00885	0.00511	0.01111	0.00600
13	0.01031	0.00595	0.01204	0.00609
14	0.01194	0.00689	0.01296	0.00607
15	0.01377	0.00795	0.01389	0.00594

Maximum error in undercutting at 13 deg. = 0.00609 in.
Total correction of 0.01218 in.

Simple Press Safety Device

A man was seriously injured in a war plant when a press ram fell during an interruption of the shop air pressure. To prevent a recurrence of such tragedies, all air-operated presses have been equipped with a check valve in the air line. The check is placed between the machine and the air inlet valve in the shop line. Now if the air pressure fails, the air trapped in the ram cylinder and the piping up to the check valve acts as a cushion and holds the ram in the up position.

RUSSIA

Threat . . . or Promise?

WHEN this war is ended, two nations—the United States and Russia—will possess the bulk of the world's military and industrial might.

Whether this new situation will hold seeds of catastrophe or of unprecedented opportunity will be determined by policies . . . still to be formulated.

If this concentration of power leads to a bitter struggle for supremacy, then the world will be turned into a giant munitions factory.

If it is used cooperatively to maintain order, then, I believe, the stage is set for a long era of prosperity . . . and peace.

It is time that Americans, whether of the Right or the Left, face this basic issue squarely and open-mindedly.

☆ ☆ ☆

No group in this country has a greater stake than have business and industry in seeing that a satisfactory Russian-American understanding is reached.

Without such an understanding there can be no reasonable hope for more than a temporary and insignificant reduction of our crushing wartime tax burden. If the threat of a clash between these two giants impends, neither bankers nor governments will run the risk of lending on a scale adequate to maintain international trade at levels necessary for our future prosperity. Potential international customers, instead of buying freely in open world markets, will be forced—as during the dangerous period introduced by Hitler in the early 1930's—into the trading camp of whichever power they fear most.

If, however, Moscow and Washington will agree on cooperative plans for maintaining the peace, American business will enjoy enormous new trade opportunities after the war.

☆ ☆ ☆

Russia, during the three and one-half years since it was attacked by Hitler, has conclusively proved to a doubting world that it is a top-flight military power.

Soviet railroads did not break down under the strain of war.

Regions accounting for nearly 70 per cent of Stalin's key industries were engulfed by the invading Nazis, but before they fell, Soviet management engineers performed a near miracle by transplanting entire industries a thousand miles to the Urals with the loss of as little as four months' production in many cases.

Though American planes, trucks, and medical supplies have been welcomed by Moscow, fairness demands the admission that more than 98 per cent of American production has *not* gone to the Russian front.

Russian planning and *Russian* equipment won the victories of Leningrad, Stalingrad, and the Caucasus.

☆ ☆ ☆

But these measures of Soviet military strength—indicative as they are of an unsuspected economic development—fail to picture in adequate detail the startling potential of the Russian market after the war.

Russia, for instance, has two and one-half times the area of the United States.

It has a population of nearly 200,000,000, and this is increasing at the rate of 2,500,000 a year.

And statistics just released show that Russia has three times as many youngsters under 16 as has the United States. This is a measure both of war potential and of a vast commercial market.

And remember that in no part of the world before the war was per capita production rising as rapidly as in the Soviet Union.

☆ ☆ ☆

German armies occupied a region in Russia roughly equivalent to the territory in the United States north of Richmond, Virginia, and east of the Mississippi.

This huge area—with its counterparts of Pittsburgh, Buffalo, and Bridgeport; of Illinois corn fields, New York dairy farms, and Maine potato harvests—was *twice* subjected to the most withering destruction; first by the Russians themselves when they retreated before the Germans, and then by the Germans when they withdrew before the victorious Russians.

As a result, 30,000,000 people are in urgent need of complete reoutfitting. They need houses and shoe laces, trolley cars and baby carriages, tractors and livestock, hydroelectric plants and electric light bulbs.

Many of these needs will be met at home. It is doubtful, for instance, if Moscow will import cooking utensils or sewing machines, for many of Russia's huge war factories can quickly be converted to peacetime production of such consumer goods.

But for the rebuilding and expansion of her industries Russia looks to the United States for equipment.

Soviet representatives already are in this country with authority to negotiate for technical men and the equipment necessary to rebuild the great Donbas coal mines according to the most modern American methods.

It is important to remember that Russia's whole iron and steel industry, its non-ferrous mining and processing, some of its chemical production, much of its coke roasting and gas recovery, practically its entire automobile and tractor industry, and the largest of its hydroelectric plants, are based on American machinery and processes.

It is known among manufacturers that Russia recently has asked for bids on shipbuilding equipment, construction and roadbuilding machinery, alloy steels, textile machines, plastics, and a long list of rail, air, and water transport supplies.

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The Soviet Union, however, has more than a rehabilitation job on its drawing boards.

The first Five-Year Plan, which, as we all remember, was completed ahead of time in 1932, was devoted almost exclusively to heavy industry. Russia set out to build for itself the machines and the factories which, in later years, could turn out, at home, modern equipment for a vast range of light industries.

Stalin, when he inaugurated the second of his famous Five-Year Plans, promised that before it was completed Soviet factories would begin to turn out a flow of con-

sumer goods—ready-made dresses, canned foods, soap, cosmetics, shoes, kitchenware, automobiles, telephones, and modern houses.

But, by 1935, Moscow realized that Russia could not afford to enjoy such luxuries in the face of growing political tension in Europe. So, when the third Five-Year Plan was launched, there was no fanfare. Russians continued to wear their old clothes, to eat whatever simple food was available, and began grimly to build the industries which ultimately produced enough tanks, planes, and guns to turn the tide of battle at Stalingrad.

It is characteristic of Moscow that even before the last battles with the Nazis are over, Russia is planning to pick up its Five-Year Plans where the war had interrupted them.

Invitations to participate in a permanent exhibition in Moscow already have been mailed to American manufacturers. Soviet officials want their public to see samples of our new machine tools, aluminum and alloy products, oil-drilling machinery, bulldozers, and prefabricated kitchen equipment. Russia already is projecting specific plans to resume the job (1) of making the country an industrial giant comparable to the United States, and (2) of making life more pleasant for a long-suffering people.

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What is the measure of this postwar market in the Soviet Union?

Some estimates place the total quantity of goods which Russia might take from the United States during the first two or three years after the war as high as $5,000,000,000 a year. Then, as Russian industry is restored, imports from the United States might taper off perhaps to $2,000,000,000 a year.

Actually, these estimates are far too optimistic, unless the United States is prepared (1) to help Russia pay by buying vast quantities of Soviet raw materials, and (2) to provide large credits to handle the purchases during the first few years of rehabilitation.

The relations of American exporters with Russia during the period covered by the three Five-Year Plans have been eminently satisfactory. Moscow has met all of its obligations punctually; fifteen years of experience have reduced contract forms to the point where they cause a minimum of misunderstanding between the Russian representatives and the American producers; individual American companies with extensive prewar experience in handling Soviet business already are offering large credits on initial postwar orders though these may yet be replaced by large government credits at lower interest rates.

But the volume of trade with Russia after the war hinges upon Moscow's ability to pay. Never before the war did the United States buy more than $30,000,000 of goods a year from Russia. As late as 1938, Soviet exports to this country amounted to as little as $23,500,000, far less than enough to pay even the service charges on the credits which would have to be extended in connection with exports of several billion dollars a year. Only South Africa produces more new gold each year than the Soviet Union. But the United States does not want gold; more of it would only complicate the problem of controlling prices here.

If the United States, however, is to achieve, after the war, the high level of national income which is necessary (1) to keep our expanded factories in operation, and (2) to service the national debt, it might absorb from $90,000,000 to $100,000,000 a year of the kind of goods bought from Russia before the war—furs, timber, manganese, chromium, and handicrafts. But unless this volume of purchases from Russia can be boosted by another $50,000,000 annually, credits of the size necessary to fill immediate Russian needs could not be serviced without large supplemental importations of undesirable gold.

The nub of the situation is that Russia offers an extraordinary potential market particularly for our heavy industries which have grown so enormously during the war. But if this sales outlet is to materialize, then the United States must find a way to import from Russia (or from Russia's debtors if any) from ten to twenty times as much as we did before the war. Instead of merely going after the export business, American businessmen must explore with the Russians the possibility of buying bigger supplies of Soviet products.

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But more than the Russian market itself hinges upon sound cooperative action by the world's two leading military-industrial nations.

If trade between them is held to a minimum and if relations are strained, the flow of trade all over the world will be adversely affected.

Europe, long this country's biggest export outlet, certainly will never take the bold steps necessary to reconstitute its economy on a peacetime basis if Russia and the United States drift into a race for military supremacy.

The Balkan states, which may be industrialized by Moscow in order to reduce their dependence on Germany, and the Arab world with its huge need for transportation, irrigation, and sanitation, will not dare accept American credits or make big contracts with American engineers if Moscow frowns on the deals.

And refusal of Russia and the United States to work cooperatively to maintain the peace would kill, in their present embryonic stage, all dreams of a vast industrialization program for China.

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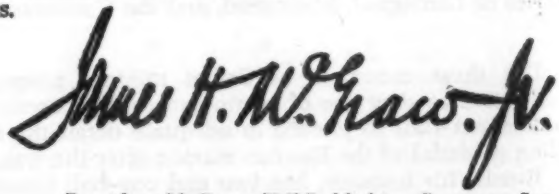
The opportunity to make a major change in the trade map of the world and at the same time to achieve a sharp rise in our own standard of living is before us.

It demands of American business leaders the kind of boldness and imagination that their predecessors displayed when they pioneered this country's unknown West.

It demands realistic action by men who know that the solution to this country's *real* foreign trade problem under today's conditions lies in boosting *imports* not exports alone . . . men who are not afraid of being paid for what they sell.

It calls for leaders who will approach Moscow and other major customers at once with constructive plans that would parallel in scope those on which this country is waging war . . . leaders who will make it clear at the outset that this bid for cooperative action emphatically demands that each nation shall have complete freedom to determine its internal political and economic organization without interference from the other.

It is *this* caliber of leadership upon which our future hinges.



President McGraw-Hill Publishing Company, Inc.

Hard-Faced Punches and Dies Used to Blank Tungsten Sheet

BY HOWARD W. PHILIP, GENERAL SUPERINTENDENT. FANSTEEL METALLURGICAL CORPORATION

Tools hardened with Tantung 53 satisfactory for meeting high temperatures necessary for the blanking operations on tungsten

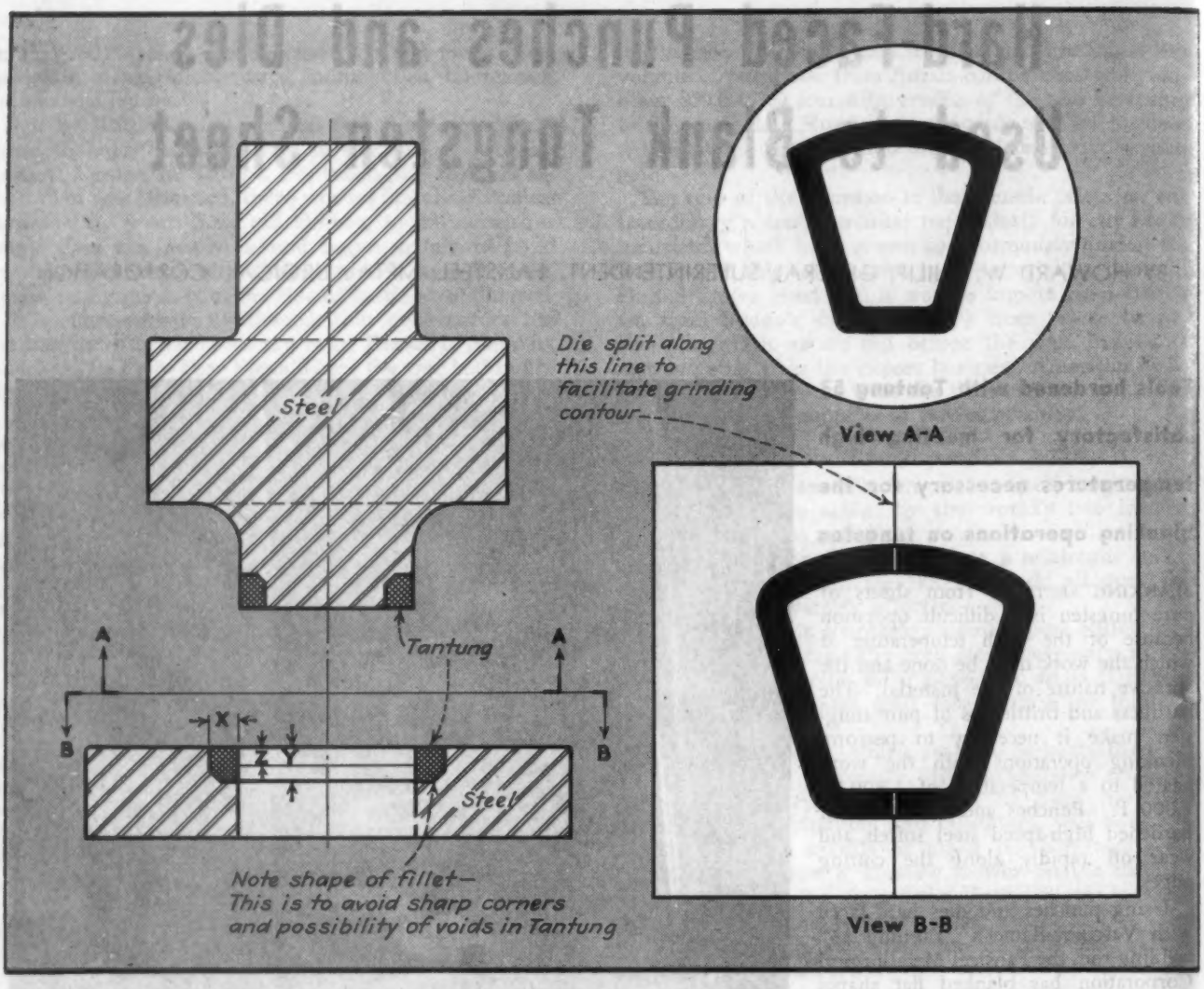
BLANKING SECTIONS from sheets of pure tungsten is a difficult operation because of the high temperature at which the work must be done and the abrasive nature of the material. The hardness and brittleness of pure tungsten make it necessary to perform blanking operations with the work heated to a temperature of 1,800 to 2,000 F. Punches and dies made of hardened high-speed steel soften and wear off rapidly along the cutting edges.

Using punches and dies hard-faced with Vascoloy-Ramet's "Tantung 53" welding rod, the Fansteel Metallurgical Corporation has blanked flat shapes from sheet tungsten almost 3/16 in. thick. In one case, a punch and die set having a cutting-edge periphery of approximately 14 in. was used to blank flat pieces from 0.180 in. thick pure tungsten sheet. This die set produced more than 1,000 pieces and the punch and die did not need regrinding at the end of the run. The successful application of punches and dies hard faced with Tantung 53 for blanking parts from sheets of pure tungsten is indicative of the value of this material for hard facing punches and dies employed for hot trimming, forgings, and for similar applications.

The accompanying sketches indicate how Tantung 53 is deposited into milled recesses around the contours of punches and dies. In the case of punches and dies for blanking or hot trimming operations, the recesses around the cutting edge contours must be of sufficient proportions to insure adequate support for the Tantung cutting edge. For average conditions, such as for hard facing dies for hot trimming forgings, the dimensions *X* and *Y* for the recess in the dies can be approximately ¼ and ⅜ in., respectively. Where the punch and die must withstand maximum stresses, as when punching sheet tungsten, the dimension *X* should be increased to ⅜ in. and dimension *Y* should be about ½ in. In each case, the recess around the cutting edge of the punch should be of the same dimensions as those for the recess in the die.

Pure tungsten sheet is blanked with punches and dies hard-faced with Tantung 53 rod, where high-speed steel punches and dies wear away rapidly. Here, a No. 5 Consolidated press is being used for punching a 0.180 in. thick tungsten sheet heated to 1,800-2,000 F. Punch and die are swabbed with Aquadag between each stroke of the press

To insure maximum support for the cutting edge, the die contour is relieved with about 1 to 2 deg. clearance angle to about one-half the thickness of the hard facing, leaving a vertical edge *Z* of about one-half the thickness of the hard facing around the contour of the die. Usually, the punch is relieved in the same manner. When milling the recesses around the contours of the punch and die, it is desirable to leave an angular or radiused fillet, as indicated in the sketch. We have found SAE 1045 steel ideal for this hard facing application. It is easily welded and requires no treatment either before or after the metal is applied. Some applications may require other types of alloy or higher carbon steels to insure greater stiffness and strength; the suc-



Hard-faced dies for hot-work operations can be made from SAE 1045 steel when Tantung 53 rod is used for hard facing the cutting edges as shown. A stripper cut from 3/8-in. thick boiler plate is used with this die set

cess of such applications depends entirely upon the treatment given the steel before and after the application.

Careful preparation of the steel die or part receiving the hard facing is advisable; clean the base metal thoroughly removing all scale and oxides by grinding, machining or filing. Do not leave sharp corners. Preheating is necessary and can be done with a neutral oxyacetylene flame or in a furnace, if the part is heavy. It is advisable to preheat to a cherry red prior to hard facing. If the part is large, a second torch is sometimes required to hold the work at required temperature after removing from the furnace, while the hard facing is being performed.

Tantung 53 hard facing is applied with an oxyacetylene torch. The size of torch tip selected is usually one to two sizes larger than normally used for depositing steel rod, this is advisable because the flame should be relatively soft. The flame is adjusted with an excess of acetylene, the acetylene feather being about three times the length of the inner cone.

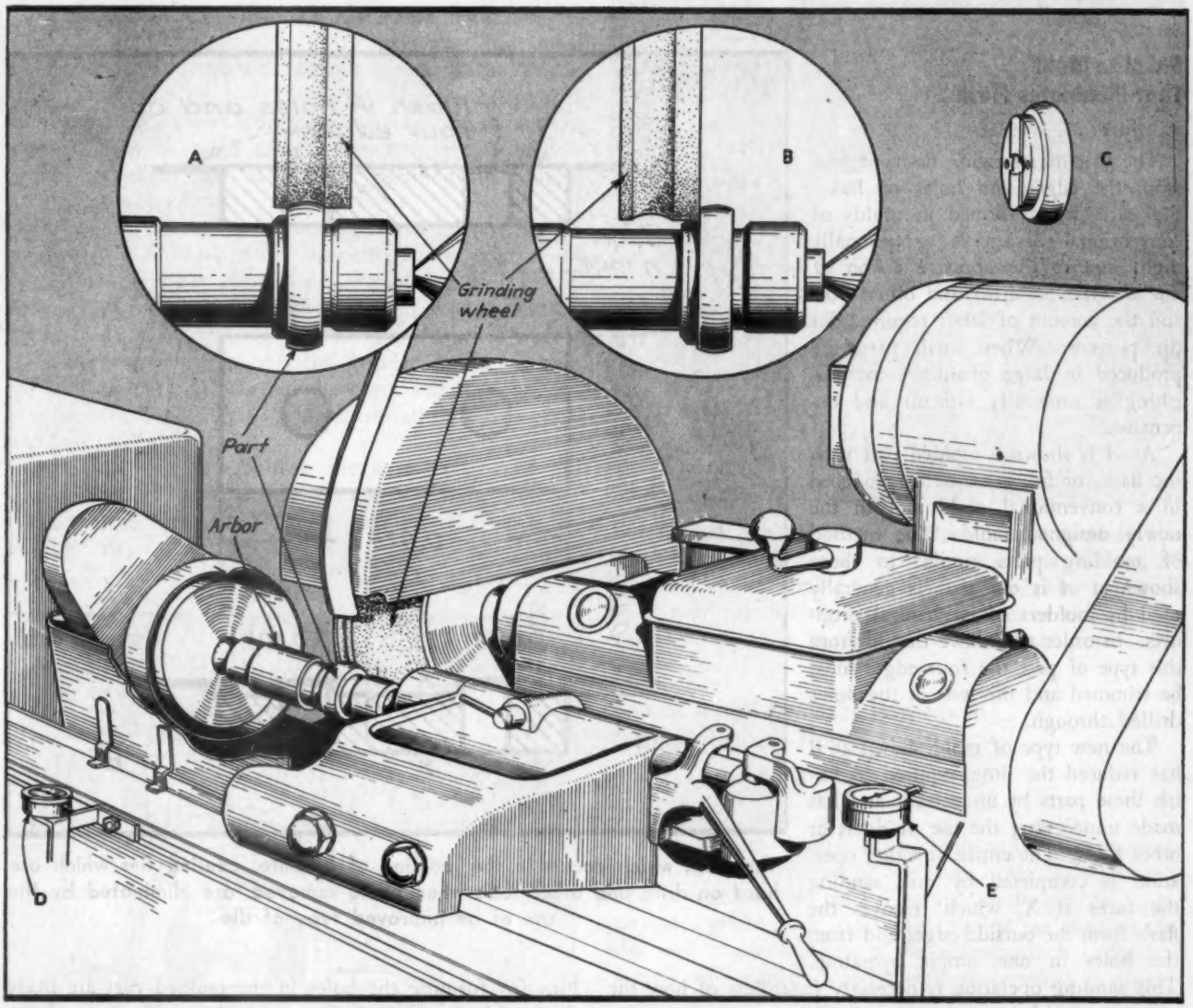
To apply the Tantung 53 bring the base metal to a sweating heat, but do not melt it. Then bring the end of the Tantung rod into the flame and melt the metal onto the sweating surface of steel. If the flame is properly adjusted and the steel is at a sweating temperature the Tantung 53 will spread with the flame; spreading of the alloy should never be done with the rod. If possible the deposit should be built up to desired thickness as the hard facing progresses. If the deposit becomes too liquid to stay where desired, change the angle of torch so that the flame is directed more on the rod and less on the deposited alloy. Allow the deposited hard facing to project slightly beyond the edge of the recess in the die or on the punch, this is necessary to insure a sharp edge if the part is to be finish ground.

The hard facing operation should be completed in as short a time as possible and then the die should be allowed to cool slowly in air, or should be buried in lime or powdered mica to insure slow cooling. At no time should a hard faced die be quenched in oil or water, as this is certain to lead to cracking of the Tantung deposit.

Tantung is ground by ordinary shop methods, no special technique being required except that care should be taken to avoid loading the wheels. The work should be ground dry, or well flooded with a coolant. Any good wheel suitable for grinding high-speed steel can be employed. To facilitate grinding inside the contour of hard faced dies, these dies generally are made with the die-plate split, as indicated in the accompanying sketch. The two plates are bolted to a heavy shoe between large rails which keep the two die-halves from spreading under the pressure of the operation.

Practical Ideas

★ **War-Winning Suggestions appearing on these pages were selected from those recognized as meritorious by the Board for Individual Awards, War Production Drive. They are freely offered to industry as an aid to war production** ★



The use of two indicators has eliminated the double grinding and handling formerly required on small parts, involving the use of two men and two machines, and the operation is now completed by one man on one machine

Two Grinding Operations Combined

BY GEORGE A. FRY
Packard Motor Car Company

Two grinding operations were performed at *A* and *B* on part *C* in the accompanying illustration. The operation *A* consisted of grinding the 1.023 in. spherical diameter, plus 0.000, in., minus 0.002 in., by dressing a corresponding spherical diameter in the wheel. The second operation at *B* involved the grinding of 0.899 in. diameter, plus 0.000 in., minus 0.001 in., and also the face of the part at the same time. These operations were formerly run on separate machines, which necessitated handling each part twice and repeated checking of the close dimensions required.

In order to eliminate the double operation, a method was developed whereby the grinding of these parts was combined in one operation on the same machine. This was accomplished by the installation of two indicators, one at *D* and the other at *E*. The indicator at *D* will locate accurately the center of the spherical diameter, which must be held centralized with the vertical center line of the part within plus or minus 0.005 in. and the indicator *E* will simplify the grinding of the 0.899 in., plus 0.000 in. diameter. This eliminates the constant checking of these diameters while grinding, in order to meet the close tolerances required, and one-half of the handling time previously required.

Two men and two machines, working 16 hours a day, were required formerly to produce 192 pieces. With this improved set-up one man and one machine produce 280 pieces in 16 hours, and one man and one machine have been released for other work. On a yearly basis the saving effected amounts to approximately 4,600 man hours a year and a corresponding number of machine hours. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

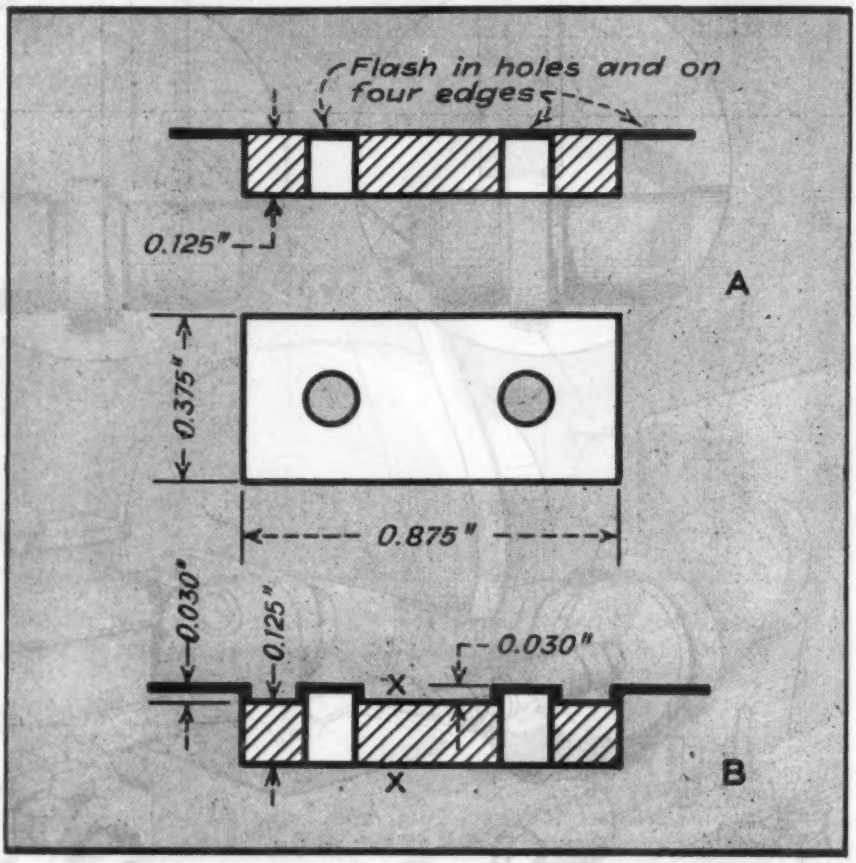
Bakelite Mold That Eliminates Flash

BY HARRY G. WESSEL

The cost of removing flash, or fins, from the edges and holes of Bakelite parts when formed in molds of conventional design is exceptionally high, due to the abrasive action of the material on drills and other tools and the amount of labor required for the purpose. When small parts are produced in large quantities the finishing is unusually difficult and expensive.

At *A* is shown a molded part with the flash, or fin, attached as produced in a conventional mold and in the newly designed mold. The method of molding parts similar to those shown at *A* is one that is generally used by molders of mechanical products. In order to remove the fin from this type of part the four edges must be trimmed and the web in the holes drilled through.

The new type of mold shown at *B* has reduced the time required to finish these parts by 80 percent and has made unnecessary the use of drills or other tools. The entire finishing operation is completed by disk sanding the faces at *X*, which removes the flash from the outside edges and from the holes in one simple operation. This sanding operation is necessary regardless of how the parts are molded, in order to correct warpage of the finished part.



The flash which occurs in the molding of Bakelite, causing fins which are hard on drills and other tools when being removed, are eliminated by the use of an improved type of die

The cavities in the mold for the part shown at *B* are made 0.020 in. deeper than the thickness of the required part. The force, or plunger, portion of the mold is made with rectangular projections on the face, these projections being made 0.020 in. smaller on each side than the size of the mold cavity. The projections are made 0.030 in. high from the face of the plunger. These projections enter the mold cavities for a depth of 0.020 in., thus permitting a flash of 0.010 in. between the face of the plunger and the face or lands on the mold portion containing the cavities. Pins for forming the holes in the molded part are made flush with the face of the cavity plate. The face of the projections on the plunger have counterbores located to match the pins in the cavity plate. These counterbores are 0.020 in. larger in diameter than the pins and are 0.030 in. deep. This permits a flash of 0.010 in. on the face and around the diameter of the pins.

This new design of mold is in successful operation in multiple cavity molds for automatic presses, as well as in single cavity hand molds for larger parts. On a production schedule of 100,000 parts per week the savings realized are considerable, as the trimming of the four edges and drilling operations are eliminated entirely.

Production Tripled by Revision Of a Milling Process

BY I. F. HUEY AND WILLIAM F. DONEY
Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pa.

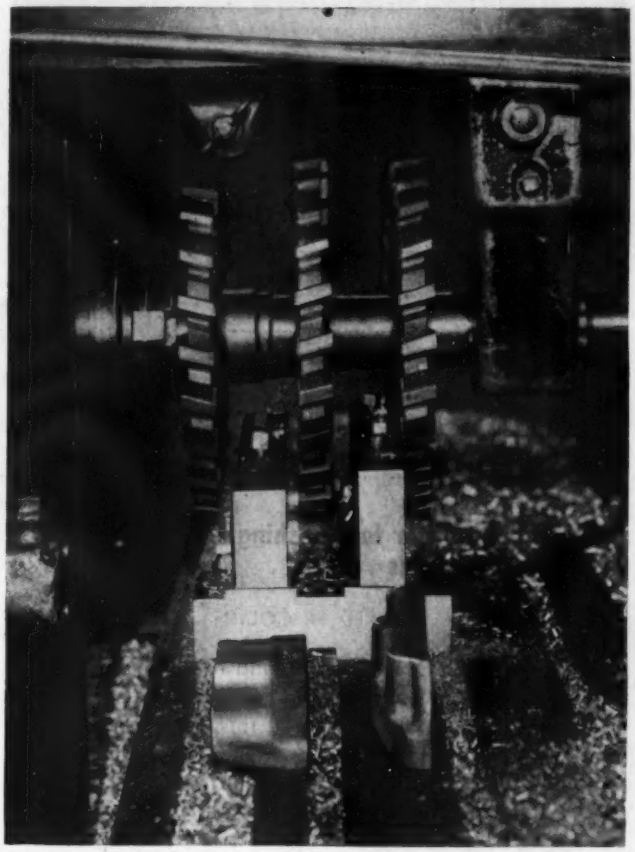
Cast bronze coil supports, which are used for supporting rotating field coils on small, salient pole, synchronous generators, one face at a time, were formerly machined with a spiral milling cutter after being clamped between the jaws of a milling machine table vise.

In order to increase the production rate a fixture was designed to hold two castings. Two cutters were also added to the set-up, and two sides of one piece and the bottom of a second part are now finish machined at one pass of the cutters. As a result of the new set-up the production rate has been increased about 300 percent above the rate which prevailed only one cutter was used for milling a single face at a time.

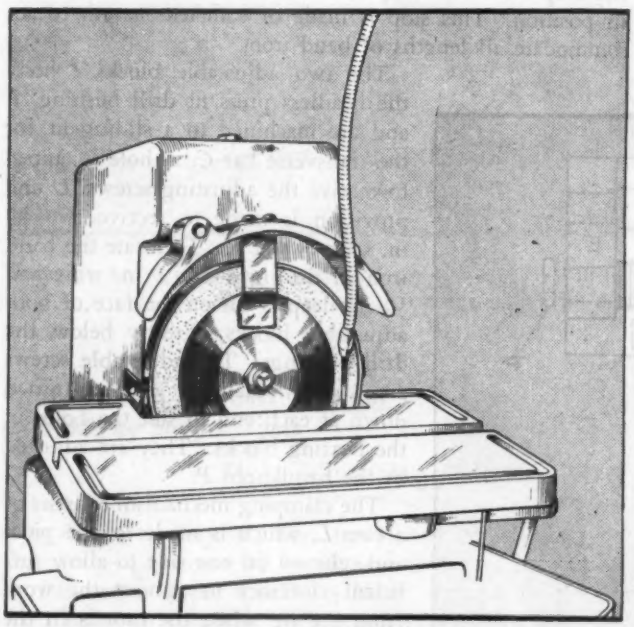
In making the set-up an ammeter was inserted in the motor circuit in order to determine the rate of table travel permissible without danger of overloading the motor. Satisfactory cutter life was obtained with a tooth loading of 0.008 in.

A motor-driven, foot-operated grinder is located near the milling machine to grind the burrs and with this arrangement it is possible to grind them during the machining time.

After the parts are drilled, the burrs created by the drill are removed with a small round-end burring tool and the bronze coil supports are then ready for riveting to the hole assembly.



The use of two additional cutters, made possible the machining of two bronze castings at a time, instead of one and the grouping of grinding and burr removal units near the milling machine resulted in a large increase in the production rate of these parts



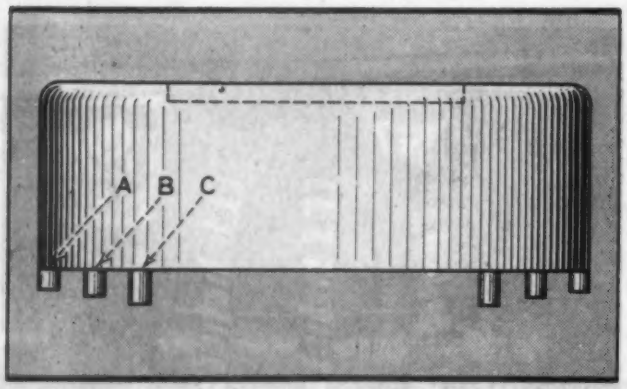
Diamond impregnated grinding wheels were frequently ruined and operators injured by the improper grinding of carbide-tipped tools. This is now prevented by a guard which permits grinding only on the proper section of the outside surface

Special Guard Removes Hazards in Grinding Carbide-Tipped Tools

BY GEORGE SCHAEL
Star Electric Motor Company

When tungsten carbide-tipped tools required sharpening it was the usual custom of the shop operators who used them to regrind them on a diamond grinding wheel. Absence of a guard made it possible to grind the tools on the edge and inside surfaces of the wheel, which invariably chipped and ruined it and frequently resulted in injury of the operator. During the past year such injuries have been responsible for lost time amounting to approximately 48 man-hours and four diamond wheels which were practically new were entirely destroyed by toolbits digging into their outer edges while being ground, the cost of the wheels amounting to several hundred dollars.

In order to eliminate this loss of time and waste of wheels a guard was designed, which has proved satisfactory for the purpose, as it allows tools to be ground on the outside surface of the wheel only, which removes the hazard of injury to the operator and probability of damage to the wheel. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



A milling cutter, with three sets of teeth, removes metal progressively and provides a good finish on hard steel castings impregnated with sand and other inclusions

Novel Milling Cutter for Finishing Hard, Dirty Castings

BY FRED H. COLVIN

A lot of steel castings were found to be not only hard, but full of sand and other inclusions on the side which was uppermost in the mold. To offset this, considerable metal was left for finishing, but this presented a real problem to the milling department in the way of cutter maintenance.

It was found impossible to finish the pieces with a single cut, as the inclusions dulled the cutter badly and prevented the desired finish. In order to meet this condition a cutter was made with three sets of teeth, set at different distances from the center, as shown in the illustration. These teeth were of different lengths, each set removing metal left by the preceding cutters.

Teeth rows *A* and *B* removed most of the metal, including the sand and inclusions, while the third row, *C*, took a comparatively light cut and left a good finish. If two cutters were available one could be removed for sharpening, while the second cutter was at work. While this idea of dividing cuts is old, it is not always applied to cases of this kind.

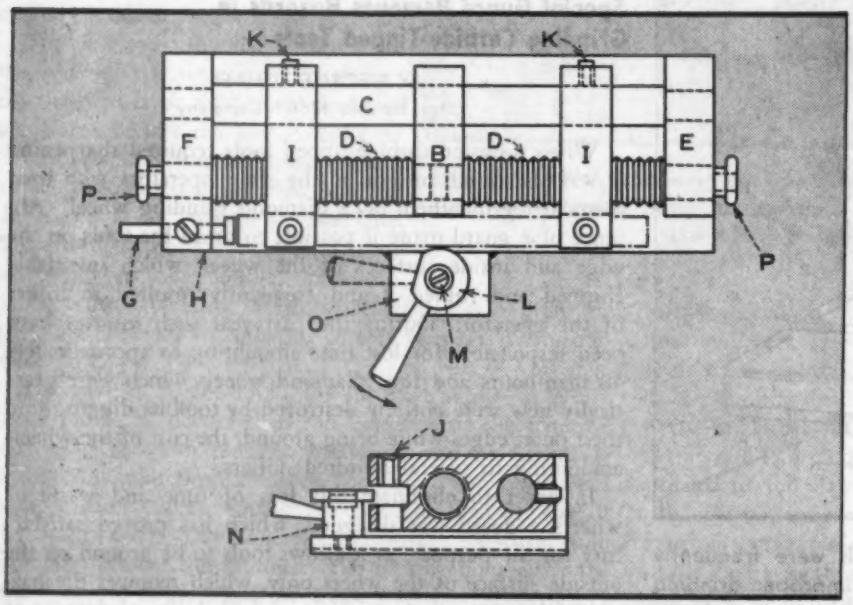
Adjustable Drill Jig Locates Centers on Metal Strips

BY ALEX S. ARNOTT

The drill jig illustrated is a design suited for a wide range of adjustment of bushing centers and serves to locate two $\frac{3}{8}$ in. diameter holes to any centers between the dimensions of 3 and 10 in. The material to be drilled is band iron 1 in. wide by $\frac{1}{8}$ in. thick, the length varying from 6 to 12 in. An outline of a sample piece of band iron 12 in. long, with 10 in. centers, is indicated.

The drill jig base is made from boiler plate or machine steel, the top of which is suitably machined to enable fitting the various jig parts into position. A relief is machined at the bottom to assure an even balance of the jig on the table.

The center bearing, *B*, is bored to suit the diameter of transverse bar *C* which passes through it. A hole is also bored as a running fit for the ends of the adjusting screw, *D*. The end support, *E*, is bored to a press fit to receive the transverse bar and is machined to a snug fit for the adjusting screw *D*. At the opposite end of the jig the supporting block *F* is machined in a similar manner and serves the same purpose as the block *E*, except that it is machined to receive the adjustable stop *G*, a hole being tapped above the stop hole for a $\frac{1}{4}$ in. setscrew, *H*, to lock the stop in position. This stop is made of sufficient length to accommodate all lengths of band iron.



This device for locating centers in drilling thin strips of metal can be assembled easily and has a wide range of adjustment

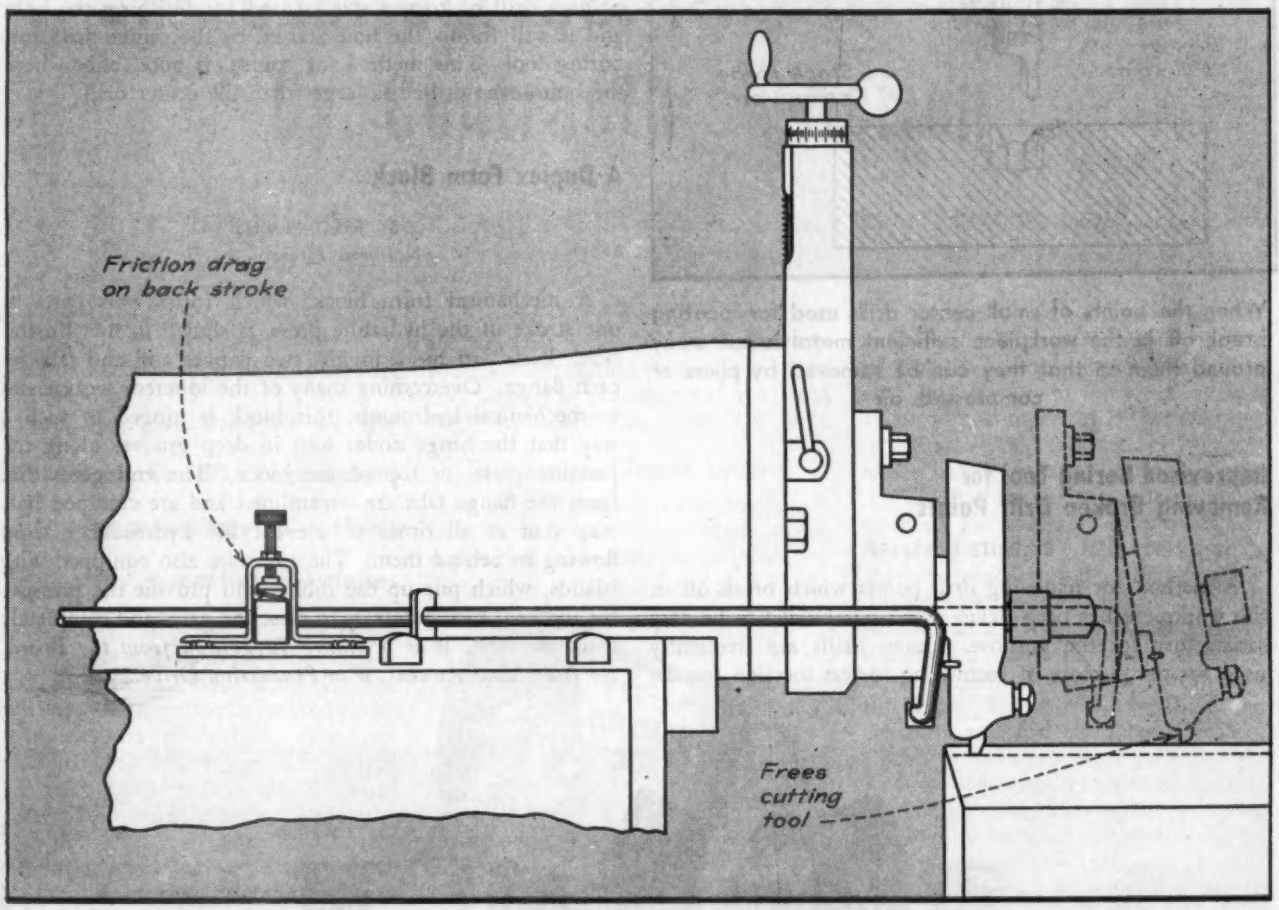
The two adjustable blocks *I* hold the headless press fit drill bushing, *I*, and are machined to a sliding fit for the transverse bar *C*. A hole is tapped to receive the adjusting screws, *D* and provision is made to receive two $\frac{1}{4}$ in. setscrews at *K*. To locate the band iron in the jig a slot 1 in. wide and $\frac{1}{4}$ in. deep is cut on the face of both adjustable blocks, directly below the drill bushings. The adjustable screws are 1 in. in diameter and are turned down at each end to suit the holes in the bearing blocks. They are adjusted by the handknobs *P*.

The clamping mechanism consists of a cam *L*, which is made in one piece and relieved on one side to allow sufficient clearance to remove the work from the jig when the cam is in the open position, as shown by the dotted lines. The cam rotates about the shoulder screw and is raised to the level of the locating slot by the spacer *N*. This complete clamping mechanism

is mounted on the piece *O*, which is an extension welded to the body of the jig.

The adjustment of the bushing centers may be made by turning the handknob which turns the adjusting screw, moving the adjustable blocks along the length of the screw to the desired position. When the centers of the bushings are in the desired location the two setscrews, *K* are tightened against the transverse bar to lock the adjustable blocks into position for the operation.

In operation, the material is inserted in the jig through the slots from the right-hand end until it is located by the stop, *G*. The cam is then turned in the direction of the arrow to push the material against the back of the slots, locking it into position in the jig. The two holes are then drilled in the band iron through the holes in the drill bushings.



Damage to work being machined on a shaper, caused by the tool dragging across it on the backstroke has been eliminated by an arrangement of a sliding rod, supported by friction blocks

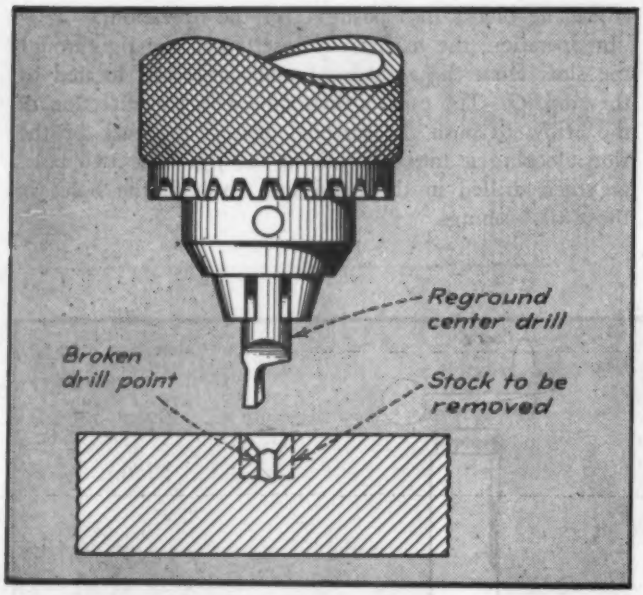
Friction Block Prevents Scarring Of Work by Shaper Tools

BY A. J. DUCKER
Marinship Corporation

It frequently happens that tools used on shaper jobs are dragged across the workpiece by the backstroke of the shaper head, which results in scarring it.

In order to eliminate such scarring, a device was designed which consists of a sliding rod, positioned parallel to the shaper head, the movement of which is retarded by friction blocks. The end of the rod is bent down and loosely secured to the pivoted toolholder, the result being that as the head and tool move forward a cut is made, the rod sliding on the friction blocks. On the backward movement the tool is lifted by the retarding action of the rod on the head's initial backward movement, after which the tool head moves the rod again in the forward, or cutting movement.

The action of the friction blocks prevents the tool from dragging along the workpiece and scarring it and also prolongs the life of the tool to about four times what it had been previously, due to the dragging action. The scoring of the work frequently made finishing difficult, requiring 25 percent more time and machining than is required since adoption of the friction blocks. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



When the points of small center drills used for locating break off in the workpiece sufficient metal is cut away around them so that they can be removed by pliers or compressed air

Improvised Boring Tool for Removing Broken Drill Points

BY FRITZ L. KELLER

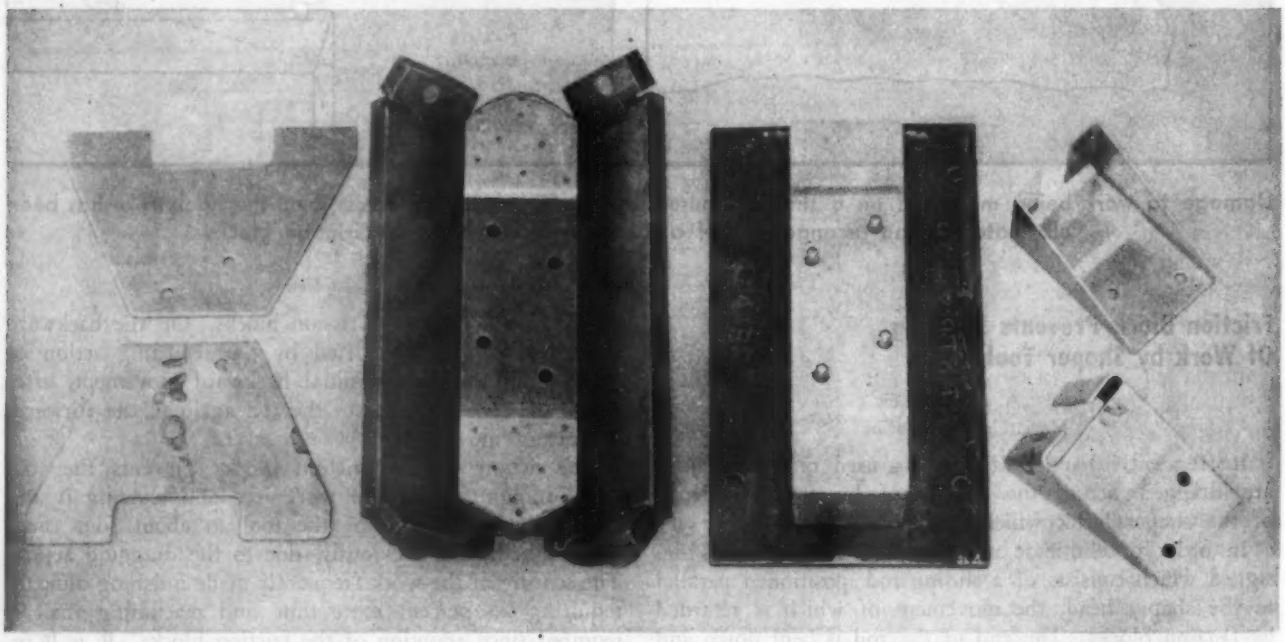
A method for removing drill points which break off in the workpiece has been devised and has proved to be very satisfactory for the purpose. Center drills are frequently used for the purpose of furnishing correct location for the larger size drill that follows. This is common practice when holes are to be drilled accurately by a vertical miller, or jig borer.

When the point of the center drill breaks off, the pointed end is usually embedded firmly in the material being drilled. In such cases the body of the center drill is reground into a form of boring tool, which is used to cut away the metal around the embedded point until it is free enough to be lifted out of the hole with tweezers or pliers, or blown out with compressed air. After removal of the broken point a drill of correct size is used for finishing the hole and it will follow the hole started by the center drill and boring tool. This method, of course, is good only where the hole to be drilled is larger than the center drill.

A Duplex Form Block

BY FRED ELKINS
Northrop Aircraft, Inc.

A mechanical form block, which forms two parts at one stroke of the hydraulic press, is shown in the illustration. Each part has a joggle, two flanges and end tabs on each flange. Overcoming many of the inherent weaknesses in mechanical hydrotools, this block is hinged in such a way that the hinge nodes turn in deep grooves along the pressure plate, or top of the block. The end gates that form the flange tabs are streamlined and are cramped half way shut at all times to prevent the hydrorubber from flowing in behind them. The gates are also equipped with islands, which pile up the rubber and provide the pressure for the final kick necessary to close the gates and completely form the tabs. *War Winning Suggestion from the Board, for Individual Awards, War Production Drive.*



Hydraulic press operations usually produce one part at each stroke, but this improved type of form block produces two parts

RECONVERSION
★★★
SECTION OF AMERICAN MACHINIST

War Contract Settlements Speeded By Contractors' Action

BY ROBERT P. BABCOCK, PRESIDENT, SEABOARD COMMERCIAL CORPORATION

Industry can benefit from these proposals to speed terminations, based upon an analysis of the difficulties of 50 contractors and sub-contractors in settling their own cancellation claims

SOME EIGHT MONTHS AGO we began a study of war contract terminations and settlements, since they are the first essential steps toward reconversion of peace-time production. The reasons for our interest in this matter are: (1) we have two wholly owned subsidiary manufacturing companies 100 percent engaged in war work; (2) we have finaced over $100,000,000 of the war effort through credit arrangements for war contracts; and (3) many of these clients require assistance on contract termination.

Accordingly, our research and advisory staff has analyzed the contract settlement experience of some fifty companies and discussed the problem with prominent accounting firms having extensive experience in guiding large and small companies through termination, with procurement representatives of the armed services and with legal experts.

Our survey demonstrated conclusively that the contractor's best approach to contract settlement should be aimed at obtaining a speedy negotiated settlement. We found the procurement agencies of the government, in general, better prepared to achieve this objective than most business firms. We also found that the promptness of settlement largely depends on the contractors themselves, and this is particularly true since the enactment of the Contract Settlement Act, 1944, last July.

Termination Clauses Lacking

In over 50 percent of the cases studied, subcontractors and some prime contractors had contracts without any

termination clauses or with such clauses very loosely or vaguely worded. Some were still operating under letters of intent, purchase orders and informal orders or changes in original orders or contracts, or under verbal agreements. All these should be put into explicit, written form embracing the approved uniform termination clauses.

Even some weeks after the Contract Settlement Act became effective last July, many contractors were not aware that Section 6 (g) of that Act not only authorzied, but it virtually directed that "Where any war contract does not provide for or provides against . . . fair compensation for its termination, the contracting agency, either before or after its termination . . ." shall move to secure amendment of the contract "to provide for fair compensation." The most acceptable and practical way of securing the desired amendment is usually through addition to the contract of the uniform termination clause or article approved by the Joint Contract Termination Board last January and May for prime contracts and for subcontracts respectively.

These uniform termination articles have a very direct bearing on the speed with which contract settlement can be worked out. They spell out in considerable detail just what is going to happen when termination "for the convenience of the Government" comes along, usually with little or no warning. The contractor can learn from his termination clause and the accompanying statements of policy and principles what factors will determine the costs for which he can claim reimbursement.

"Pre-determination" Important

Those contractors who had negotiated some large and complex settlements with speed and smoothness had invariably taken great trouble to get together with their contracting officer well before any termination was in sight.

They had furnished the contracting officer with a written statement covering their methods of cost keeping,

distribution of overhead, and general accounting procedures. Nearly every business has some novel application of "recognized commercial accounting practices," which, while perfectly sound and reasonable, often raises questions in the mind of the contract settlement officers unfamiliar with the particular business under review. Getting together ahead of time with the contracting officer gives an opportunity to clarify points of this sort and may make a complete audit unnecessary, permitting the contractor's figures on his settlement proposal to be accepted with only spot checks and an office review.

Under some circumstances, it may be more economical from the government's viewpoint to continue certain limited production for a short time than to shut down abruptly. If such a course in the event of termination would better protect the Government's interest, the contractor should thoroughly discuss the matter with the contracting officer and secure his approval.

Advance Discussions Helpful

But this problem must be examined and its basic principles agreed on before the termination notice is on its way, for it cannot be done after the event. If, however, the matter has been fully discussed with the contracting officer, settlement will obviously be speeded by having production stopped on the basis previously agreed upon with the contracting officer as being in the Government's interest.

A clear understanding on the basic principles of valuing surplus inventories of supplies, materials, work in process, tools and special equipment can be reached by arrangement with the contracting officer long before termination becomes a fact. Once such principles are decided, it is usually a relatively simple and speedy task to apply those agreed principles in preparing and auditing the actual figures on the settlement proposal. This has come to be referred to as "pre-determination," and is being practiced more and more by contractors seeking to minimize their post-termination troubles.

Cost of Preparing Claims

Another large percentage of contractors had not given enough thought to the recovery of the frequently large costs of preparing the termination settlements. For example, one manufacturer of artillery mount subassemblies incurred almost $5,000 of perfectly legitimate extra expense in preparing his claims. Yet, settlement of his claim was held up because his accounting records had not made adequate provision for segregating these charges from general administrative overhead expense chargeable to other contracts. It is important that accounting records or procedures permit ready segregation of those costs which arise in connection with a termination-accounting services, expenditures for protection of Government property, and other expenses necessarily incurred in formulating the settlement, in stopping production, etc.

There are two essentials to securing approval of claims for these items: 1. They must be reasonable in view of the size of the claim and the amount of work involved; and 2. They must be clearly identifiable with the contracts to which they relate and otherwise fully supported by the accounting and other records. Contracting officers generally appear to regard as a proper post-termination charge any expenditures, reasonable in amount, for work or services which expedited settlement or protected the Government's interest, but they do require clear accounting evidence of the amount of the expenditure and its relation to the terminated contract.

Negotiated Settlements

In the course of our survey we found a certain confusion of thought on the subject of "negotiated settlements." The Contract Settlement Act, approved last July, in Section 6 (c) provides that where a contracting agency has made a settlement of any war contract, such "settlement shall be final and conclusive" except for fraud, or as mutually agreed, or for renegotiation under the Renegotiation Act. In Section 15 it is provided that no officer or agent of the Government shall have personal liability for any such settlement or payment "in the absence of fraud on his part." These passages in the Act of 1944 are the legal basis for the "negotiated settlement."

Briefly, this means that contracting officers have the authority to make final settlements by direct business negotiations, with audits and reviews restricted to what they deem expedient to protect the Government's interest.

There is no special procedure required to arrange for a negotiated settlement, since it is government policy to utilize this method wherever possible. To work out a negotiated settlement, it is imperative that the contractor be in a position to support his claims with sound accounting records, and to control the liabilities for which he seeks reimbursement by effective production and inventory controls.

If the contractor is unable to submit his settlement proposal, adequately supported by his records, the contracting officer still has full authority to proceed to a settlement "by formula." This means a settlement in strict accordance with the letter of the contract and the regulations, subject to full audit, physical inventory checks and reviews. That is why it is so very much in the contractor's own interest not only to have his own business housekeeping in good shape, but to have a clear prior understanding with his contracting officer and his own subcontractors.

The Termination Unit

Another point came up, not only in our survey, but in the experience of many contracting officers and accountants with whom we discussed these problems. It is most important that the contractor set up as complete a unit to handle termination settlement matters as his organization permits and the volume of his contracts warrants. That unit should be headed by a top ranking executive who is familiar with all phases of the contractor's business operations.

This executive must be clothed with the fullest possible authority to deal finally with the contracting officers. For the first time in our history these Government officers have been given authority to make final settlements. If contractors do not equip their top negotiators with equal authority, they will simply be stopping themselves from getting the full benefits of speedy settlement.

At all times, contractors must be certain that their legal or contractual basis of termination is sound, complete and up-to-date. They must further be sure that their accounting and production controls are as well adapted to the new and unusual termination tasks as they have been to successful normal operations. This will guard against inadequate preparation of termination claims.

Contractors should not hesitate to utilize competent outside assistance, such as certified public accountants to review the sufficiency of the accounting records and to design any necessary modifications. Where we have assisted clients as consultants, we invariably seek to work with such accountants and with legal counsel on any legal matters which may have arisen.

This is the second postwar period through which this corporation and its predecessors have gone. We believe war contract settlement in this reconversion period should be smoother and speedier than the last one, in spite of the vastly greater volume of war contracts, provided business seriously organizes itself to take full advantage of the machinery made available by the Government.

Training Meetings and Flying Squadrons Speed Terminations

Drawing subcontractors together in meetings to learn the details of termination procedures paves the way for speedy settlements, while teams of experts visit plants to guide them in quickly preparing accurate, all-inclusive, claims

THROUGH MEETINGS to instruct its 78 subcontractors and flying squadrons of experts to aid them, Remington Rand Propeller Division is speeding their submission of comprehensive, accurate termination claims.

The meetings, held in the Johnson City plant of the division, have done much to dispel apprehension from the minds of the subcontractors, while instilling in them the necessity of immediately taking steps preparatory to termination.

The first meeting was devoted to an over-all discussion of the problem, divided into its legal, financial and material control aspects. A second meeting conducted by Remington Rand accountants—for like employees of subcontractors—was devoted in more detail to the financial portion of the problem.

At a third meeting it is planned to treat of material control, while carrying a specific termination through to completion before the group.

Subcontractors are being encouraged, at these meetings, to appoint competent officers with full authority to execute terminations. They are encouraged to set up inventory control systems and to maintain inventories at practical working limits, not in excess of 60 days.

Concrete results of these meetings have been reflected in the speedier filing of more accurate claims and the faster disposal of surplus inventories. In some instances the information has been passed on to the second tier subcontractors by those whose representatives attended the meeting.

Squadrons Speed Settlement

Rather than rely upon the interchange of communications between Remington Rand contract settlement officers and those of terminated subs, flying squadrons visit the plants of the latter and guide the preparation of the claim.

Each flying squadron consists of a quality man, an auditor and a tool engineer. The quality man checks whether the unfinished materials pass inspection and their value is enterable in the claim. In this inspection he will be guided by the past record of the vendor: if it has been good with regard to low spoilage of materials and high delivery of parts in quality, widely ranging spot checks will be made; if the record has been poor, every single piece may be inspected to insure against the inclusion of previously rejected ones.

An additional assurance of parts being up to quality standards lies in the Army Air Force requirement that the subcontractor make affidavit that, to the best of knowledge and belief, material submitted is not defective. If, on spot check, an unreasonable number of defective parts are found, the AAF can hold the subcontractor on charges of attempt to commit fraud, on the basis of his affidavit.

After the quality check is completed, the unfinished materials are submitted for disposal and their value entered in the claim.

The auditor-member of the flying squadron, thoroughly familiar with the details of the financial side of the settlement, oversees the preparation of the claim, aiding in pricing on the basis of vendor's costs, advising on the admissibility of items, seeing that all possible ones are included and the forms properly filled out.

It is the function of the tool engineer to determine what portion of the probable life of each tool is applicable to the terminated contract. He does this with a thorough knowledge of the rules governing the charging of tool costs against contracts, and thereby increases the likelihood of speedy completion of settlements.

Remington Rand Propeller Division has found it more expeditious and economical to send these flying squadrons to guide subcontractors in their preparation of claims, than to waste precious days in exchange of communications. Subcontracts are urged to prepare for termination, through having adequate material control systems, properly limited inventories and competent and authoritative officers and employees in charge of the work. The squadron members do not take over the work that should be performed by the subcontractor's termination department, but guide it to satisfactory completion, while checking materials and costs so that Remington Rand may conscientiously certify to their accuracy and applicability.

The flying squadron is armed with Controlled Material Plan authority to purchase material from subcontractors. After it has been determined that a subcontractor's parts in process are up to quality standard, the squadron may then certify them for purchase.

The activity of the flying squadron is considered a building up of information for the translation of components into terms of dollars and cents, so that payment can be promptly made.

In early contract settlement days, the Eastern Procurement District, AAF, had to return 72 percent of the termination claims submitted. However, with training schools and better understanding of forms used and procedures followed, this has been sharply reduced. The program of the Remington Rand Propeller Division is designed to reduce the likelihood of error and speed the final settlement of termination claims.

Financing the Reconversion

Industry's financial problems in reconversion may be solved in part by government-guaranteed loans, or credits to be drawn on as required. These may be arranged at very low interest

WHEN THE WAR ENDS, American industry may have about $10,000,000,000 tied up in termination claims. Yet, it will be faced with the problem of raising capital to proceed with reconversion. Moreover, the probable ending of the European War well in advance of the Japanese War presents industry with the problem of financing war production, converting termination claims into ready funds, and at the same time financing partial reconversion.

The seriousness of this task over the next few years indicates the necessity for a thorough examination of its financial status by every organization. At the same time, the possibility of requiring financial aid either now or in the future justifies a study of the various types of loans, advances and credits available to war contractors under all existing regulations, including the recently legislated Contract Settlement Act.

American industry's financial tools, aside from the issuance of securities or the assumption of mortgages, fall into three major categories: (1) advance or partial payments by the contracting agency; (2) commercial bank loans and credits; and (3) government-guaranteed VT-Loans, T-Loans, or V-Loans.

Liability Slowed Payments

To secure funds to aid war production, contractors may resort to advances from their contracting agency usually provided for in either fixed price contracts or cost-plus-fixed-fee contracts. Although procurement agencies have been making advances against termination claims all along, they were generally more conservative than they are permitted to be under the Contract Settlement Act. The reason for this was that contracting officers were personally liable for any overpayments made to contractors and subcontractors until July 1, 1944, when passage of the Act (S. 1718) removed this personal liability and further provided for advances representing about 90 percent of the total certified claim.

V-Loans Are Guaranteed

Where this type of financial aid is not desirable or inadequate, the contractor or sub-contractor may apply to his local bank for a straight commercial loan, or else for a "V-Loan", the major portion of which is guaranteed by the War Department, the Navy Department, or the U. S. Maritime Commission through their agency the Federal Reserve Bank. Since most industries are well familiar with bank loans, we will not go into them here except to note that private banks have made over $5,500,000,000 in credit available to war contractors and subcontractors without government guarantee.

V-Loans were formalized on April 6, 1942 under Regulation V of the Federal Reserve System, which circumvented peacetime credit rules and loan limitations by making working capital available for war production purposes to sub-contractors and contractors. The loans were made through local banks, who subsequently secured the guarantee of the government to a substantial portion of each loan. While the need for such loans has greatly diminished, they are mentioned here since they were the forerunners of the more desirable VT-Loans and T-Loans, and formed the basic pattern for them.

No VT-Loan Interest in Interim

On September 1, 1943, these loans were broadened by adding to them the VT-Loans, which assured contractors that funds tied up in war contracts would not be frozen in the event of termination. Contractors who already had V-Loans outstanding could convert them into VT-Loans.

These advantages of the V-Loan also apply to the VT-Loans: (1) Funds can be secured by companies whose financial strength would not otherwise permit them to raise such large amounts; and (2) Interest and maturity can be suspended immediately on termination of a contract until the payment of settlement claims provide funds for paying off the loan. However, the VT-Loan has these further advantages: (3) The credit available is not limited to the amount involved in the cancelled contract, but also may include the amount involved in uncancelled contracts; (4) Credit may also be based on funds usable for settling sub-contractors' claims, so long as they do not overlap the contractor's own claims for inventories and receivable; (5) In determining the amount required, the borrower may deduct bank loans, accounts payable and other current liabilities from his current assets

so that he can draw on the loan after termination to pay off these liabilities. In other words, through a VT-Loan it is possible to combine existing liabilities into one single, government-guaranteed loan.

The major advantage of the VT-Loan over a general bank loan is that the former permits the setting up of available credits on which low interest rates of a fraction of one percent would be payable until such credits were used. Moreover, on cancellation of a contract, payments upon interest and maturity stop immediately and are not required until settlement of the contract termination claims.

Seven Billions Loaned

By April 6, 1944, two years after this financing program had been launched, $7,484,000,000 in guaranteed government loans had been authorized, of which $2,001,000,000 represented VT-Loans. Of the 5,931 V-Loans and VT-Loans made, 46 percent were made for $100,000 or less thereby indicating the extent by which small business has been aided by this program.

One reason why the number of loans made has not been larger may be attributed to the red tape involved in making such loans. At Congressional hearings in late 1943, several leading contractors complained that it took too long to secure loans under the then-existing V-Loan and VT-Loan provisions.

Walter A. Mogulson, vice president, Aviation Corporation of America, reported that it took his company eight months to secure a V-Loan, which was finally accomplished by the participation of 15 banks in the loan. Meanwhile, the company's subsidiary, the Aviation Corporation of Ohio, had been forced to keep most of their subcontractors waiting for settlement of their claims for some five months. The subsidiary's contract for high-powered Naval engines had been cancelled on May 18, 1943, yet by mid-October, 1943, only 50 of its 306 subcontractors had been paid.

At the hearings, Webb Wilson, treasurer, Fairchild Airplane and Engine Company, brought out that the company spent three months trying to secure a V-Loan but without success. The reason for this was that the services were in disagreement over the company's need for working capital, and they wanted to extend advance payments rather than guarantee the loan. Other contractors told the Congressional committee that VT-Loans could only be made *before* cancellation, and that there was no provision for loans *after* cancellation.

Pledge Claims for T-Loans

In view of this situation, liberal advance payments were provided for in the Contract Settlement Act, as well as, termination loans which could be made *after* the cancellation of contracts. Formalized by the Director of Contract Settlement on August 24, 1944, the T-Loan permits contractors and sub-contractors to make formal government-guaranteed bank loans against their termination claims.

The difference between the T-Loan and advance termination payments is that the T-Loan is secured through a bank, via Federal Reserve guarantee, and covers up to 90 percent of the pending termination claim. On the other hand, advance termination payments may be made by the contracting agency upon request by the cancelled contractor in the light of certain established claims, and can go as high as about 90 percent of the value of pending termination claims.

The T-Loan, VT-Loan, and V-Loan are more desirable than advance payments because the loans may be capitalized thus providing tax relief, whereas the Treasury Department does not consider advance payments as "borrowed investment capital." On the other hand, interest payable on the government guaranteed loans is a greater expense than that attending the acceptance of advance payments, even though government-guaranteed loans usually bear lower interest rates than the regular commercial bank loan. Moreover, it would be difficult to better the low-fee basis for the credits set up under VT-, T-, or V-Loan agreements, thereby protecting the borrower in case he does not need a substantial portion of such funds. In contrast to this, a contractor working with advanced payments may have to go back to his contracting agency from time to time to secure additional funds. The advantage of suspension of maturity and interest payments on VT-Loans in the event of cancellation is another highly desirable protective factor for industry.

That is why more and more contractors are converting their V-Loans into VT-Loans. Recently, Sylvania Electric Products, Incorporated, arranged to substitute a $20,000,000 regulation VT-Loan for its former regulation V-Loan for $10,000,000, both guaranteed by the Navy Department.

Preparation Speeds Financing

Contractors and sub-contractors who have not yet availed themselves of the opportunity of taking out VT-Loans covering all their contracts, might find it advisable to do so before cancellation of the bulk of their war business. The reason is that if they wait until their contracts are cancelled, then they can only apply for T-Loans, in which event they will first have to make out their termination claims before they can apply for loans against such claims. Instead, by preparing for cancellation now, a contractor will easily be able to finance his reconversion plans while preparing the termination claim and awaiting settlement. In such cases, available VT-Loan credits will permit industries to move government-owned surpluses out of their plants at once, to begin training employees for postwar work, to proceed with engineering plans, and so on.

One example of the use of ap-

plicability of a VT-Loan is the $75,000,000 credit arranged by Nash-Kelvinator in September 1943, with a group of 21 banks. The loan was 90 percent guaranteed by the government, provided for a standby commitment fee of ⅜ths of one percent on the unused portion of the credit, and required a two-and-three-quarter percent interest rate on the amount actually borrowed.

V-Loans, VT-Loans, or T-Loans may be used to finance a single contract, a group of contracts, or all of a manufacturer's contracts. Loans can be obtained for any period up to three-and-one-half years with the contractor having to pay a maximum amount of one-half percent a year on the unused portion of the credit. Banks may charge lower commitment fees. So far as the interest rate on the sum actually borrowed against such credits is, this will vary depending upon the peculiar conditions of each situation. However, the substantial government guarantee of such loans serves to keep interest rates at going levels or lower. In such cases, Federal guarantees usually range from 60 percent to 90 percent, and may go up to 95 percent in special situations involving small loans.

Getting a Government Loan

The steps to be taken in getting any of these loans are:

1. Go to your local bank and explain your credit needs. The bank will know whether it can handle the loan by itself or in combination with other banks.

2. In either event, your banker will work with you on the application for a government-guaranteed loan of any one of the three categories mentioned above. With your help, the application must be filled out by the bank outlining: (a) description of the collateral if any; (b) nature of war production involved; (c) purpose for which funds will be used; (d) description and summary of your war contracts or sub-contracts; (e) the bank's statement of the applicant's credit standing, management and operations; (f) statement of annual salaries of the company's chief executives for the past three years, if available; (g) statement of corporate affiliates of the applicant.

3. This application along with the financial statement of the applicant for the previous three years, if available, is sent along to the Federal Reserve Bank of the particular District if the loan is under $100,000, or to Washington if for a larger amount. In cases of T-Loans, District Federal Reserve Banks may approve loans up to $500,000.

4. The Reserve Bank then analyzes the financial integrity of the applicant, determines the type of financing best suited to meet the particular situation, and prepares the necessary documents for guaranteeing a portion of the loan.

5. The borrower then makes his loan arrangement with the local bank or banks, which will have secured government guarantees for a specified portion of the loan in the manner already outlined. Interest and fees collected upon the loan are divided between the bank and the Federal Reserve, with the government's participation ranging from ten percent on a 60-percent guaranteed loan to 25 percent on a 90-percent guaranteed loan.

6. The borrower may then draw the funds as required from his local bank, and pay interest and fees to the bank. In turn, the bank will pay the Federal Reserve its portion of such interest and fees as required.

Sub-contractors having claims against the borrower in such cases are protected in that the latter must pay his sub-contractors whatever he owes them if he has used such claims as a basis for the loan.

It is not necessary for the bank to verify statements of inventories, goods in process and accounts receivable, since the borrower's certification to his statement is frequently satisfactory.

In the case of a VT-Loan on which the borrower can draw unused funds *after* cancellation, the borrower must request an adjustment on such sums so that interest may be waived. Thus, the amount of his credit is unaffected by the cancellation, but his payments against the loan and interest thereon are suspended.

Thus, these loans aid the contractors through the three major stages of his operations: (a) during war production he may secure a V-Loan; (b) to protect him against impending cancellations he may make a VT-Loan; and (c) after cancellation he can obtain a T-Loan to help finance reconversion.

ADVANCE PAYMENTS AGAINST TERMINATION CLAIMS

One means of financing available to war contractors and sub-contractors is the advance against termination claims, which may be made by contracting agencies, according to the Contract Settlement Act. Advance or partial payments may consist of:

1. **100 percent of contract price on completed acceptable items; plus**
2. **90 percent of costs of raw material, parts, direct labor and overhead allocable to the terminated part of the contract; plus**
3. **a reasonable percentage of other allowable costs, including allocable administrative overhead; plus**
4. **any additional amounts the contracting agency "deems necessary in the public interest."**
5. **Where a detailed ascertainment of costs (as in items 2 and 3) is not suitable to conditions of a war contractor or may delay his interim financing, he will be entitled to up to 90 percent of estimated costs allocable to the terminated portion of the contract.**

From these sums, deductions will be made of any advance or partial payments made prior to the post-termination loans.

Surplus Property Act Outlines Disposal Procedure

The surplus law creates a three-man Board, charged with the big disposal job. While its policies are not well defined, the act's objectives are intended to guide the Board in all its operations

THE FOLSOM COMMITTEE in its reconversion study conservatively estimated that surpluses at the end of the war would amount to between $50,000,000,000 to $60,000,000,000, in addition to which there will be the problem of disposing of some $15,000,000,000 in government owned plants and facilities. The initial task was assigned to the Surplus War Property Administration, set up by President Roosevelt on February 19, 1944, "to plan and supervise the disposal of surplus war property." The arrangement was temporary pending legislation to give the agency official standing.

In 1944, dozens of bills were introduced in both houses of Congress designed to cope with various phases of surplus disposal. Finally, a conference committee of both houses compromised on a "Surplus Property Act," based upon the Colmer Bill, H. R. 5125. The bill became law on October 3, 1944, and on October 4th, William L. Clayton, Surplus War Property Administrator, resigned in protest against the Act. Mr. Clayton was reported to have opposed the three-man board to administer the law, congressional consultations required on plant disposals, and restrictions on farm land disposal.

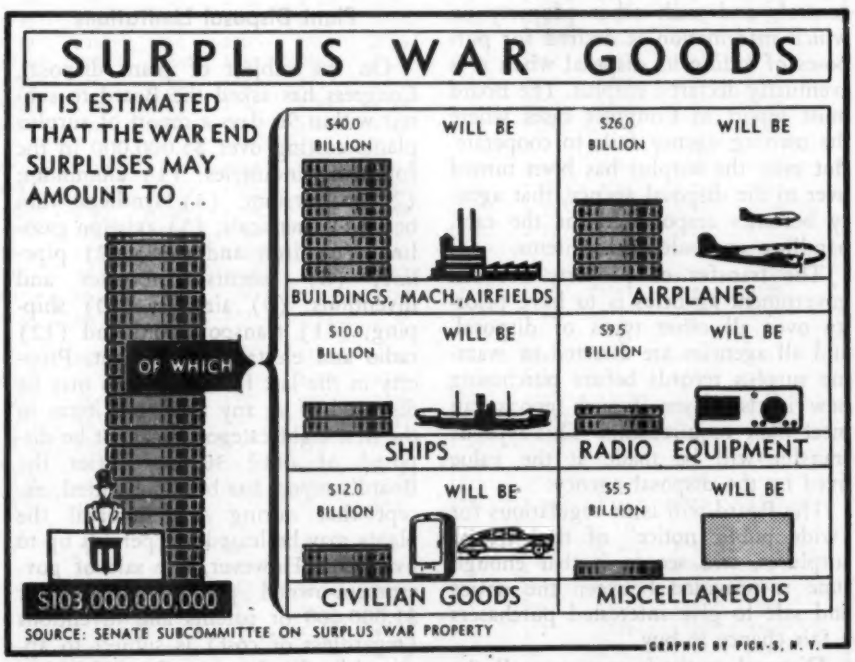
Expiring three years after the war unless extended by Congress, the Act has 20 individual objectives which boil down to the principle that surpluses should be disposed of as fairly as possible without disrupting the national economy. Under the Act, a Surplus Property Board to be comprised of three members is to be set up within the Office of War Mobilization. The members are appointed for terms of two years by the President, who designates one of them as the chairman.

The Board will direct and supervise handling and disposition of surplus property, and transfer of surpluses between government agencies. The Board is directed to coordinate the efforts and function of the various agencies dealing with surpluses. It may also direct the time, the place, the prices, terms and conditions of surplus disposal, as well as allot portions of the disposal job among particular agencies. Since the Board is to "centralize in one disposal agency responsibility for property of the same type or class," it is likely that it may follow the general outlines of the Surplus War Property Administration's plan.

The Act only specifies that the Maritime Commission is to be the disposal agency for surplus merchant vessels, which will permit that agency to continue the job originally assigned to it by SWPA. However, the SWPA made these further following assignments: (a) capital and producers' goods to the Reconstruction Finance Corporation; (b) consumer goods to the Procurement Division of the U. S. Treasury; (c) food to the War Food Administration; (d) combat ships and parts to the Navy Department; (e) housing property to the National Housing Agency; (f) community facilities financed by the Federal Works Agency to that agency; (g) surpluses abroad to the Foreign Economic Administration. Since these agencies have been acquiring experience in handling these different types of surpluses, it is likely that most of them will continue the same surplus function.

The steps in surplus disposal outlined in the Act are:

1. Swift disposal of termination inventories, with advance arrangements before cancellations sponsored.
2. Sale by the owning agency to contractors, wherever possible.
3. Transfer of surpluses between government agencies as needed.
4. Disposal of surpluses suitable for educational or health purposes to be made at low prices to States or political subdivisions, or to non-profit institutions.
5. Favorable treatment of small businessmen, veterans, and farmers.
6. Stockpiling of surpluses of strategic metals and materials.
7. General sale, exchange or lease.



A large part of this total surplus will be located abroad, and some items, such as combat planes and shell-loading plants, will not be easily sold

8. Donations of surpluses without commercial value to States and their politcal subdivisions.
9. Where this is not feasible, surpluses without commercial value are to be destroyed after 30 days' public notice of such destruction.

The initial surplus responsibility rests with the owning agencies, such as the Army and Navy, who may make sales to the contractors holding the surplus or permit them to transfer it to other contractors for war purposes. The new Board may also permit owning agencies to dispose of such surpluses for non-war purposes, but until permitted to do so, the owning agency is limited to disposal for war purposes only.

Advance Notice on Inventory

To aid war contractors get rid of termination inventories as soon as possible, the law states that contracting agencies are to advise contractors as far in advance as possible of: (a) which portion of the inventory will be retained for military purposes; and (b) how to handle and dispose of other termination inventory. The Surplus Board is to establish procedures for accomplishing this in cooperation with contracting agencies and the Director of Contract Settlements, in carrying out this provision of the law.

Once the owning agency takes possession of the surplus, it must be turned over to the appropriate disposal agency for sale under rules laid down by the Board. Owning agencies must report to the Board any surplus in their control, and such other property on which information is desired for purposes of aiding its disposal when it is eventually declared surplus. The Board must report to Congress cases where the owning agency fails to cooperate. But once the surplus has been turned over to the disposal agency, that agency becomes responsible for the care, handling and sale of the items.

The transfer of property between government agencies is to have priority over all other types of disposal, and all agencies are directed to examine surplus records before purchasing new items to see if such goods can meet their requirements. This type of transfer will be made at the value fixed by the disposal agency.

The Board will issue regulations for "wide public notice" of the sale of surpluses, and see to it that enough time is provided between the notice and sale to give interested purchasers a fair chance to buy.

Disposal methods may run all the way from sale, exchange, and lease to transferral, upon whatever terms and conditions each agency may deem proper. But credit is limited to three years in the case of small tools, components, hardware, and consumers goods. Except for this qualification, it is possible that credit terms for used equipment might be similar to those recently established by the Defense Plant Corporation, under which a minimum down payment of 15 percent was required with the balance payable in five years at four percent interest on unpaid portion.

The "suitable preference" to be provided to veterans is in order that they might acquire surpluses which may enable them to establish and maintain their own small businesses. Farmers will be given a fair chance to acquire food surpluses, and if necessary, arrangements will be made with the Agricultural Adjustment Agency to enable them to acquire trucks, machinery and equipment required in farm production.

The section devoted to small business specifies that disposal methods should not discriminate against small business, so long as they are "consistent with customary commercial practice." The Smaller War Plants Corporation is to cooperate with the Board in the furtherance of this policy, and is empowered to purchase property for resale to small business, and to make or guarantee loans to small firms to enable them to acquire and operate surplus plants and facilities. The Corporation may also cooperate with disposal agencies in arranging surplus sales to small firms on credit or time.

Plant Disposal Limitations

On the subject of plant disposal, Congress has asked the Board to submit within 90 days a report of surplus plants costing over $5,000,000 in the following industries: (1) aluminum; (2) magnesium; (3) synthetic rubber; (4) chemicals; (5) aviation gasoline; (6) iron and steel; (7) pipeline; (8) patents, processes and inventions; (9) aircraft; (10) shipping; (11) transportation; and (12) radio and electrical equipment. Property in the last four categories may be disposed of at any time, but items in the first eight categories cannot be disposed of until 30 days after the Board's report has been submitted, except that during such interval the plants may be leased for periods up to five years. However, any sale of government-owned plants costing over $1,000,000 or patents and inventions (regardless of cost) is subject to approval by the Attorney General within 90 days after such approval has been requested. The Attorney General will determine whether the proposed sale would violate anti-trust laws.

This measure of the law has been criticized by some surplus experts, who claim that large plants for the most part can only be sold to large companies able to operate them. But since large companies would only lay themselves open to criticism, they might prefer to build entirely new plants rather than get involved in a governmental dispute.

Minerals To Be Stockpiled

Government-owned surpluses of strategic minerals and metals are to be stockpiled, as authorized by the June 7, 1939 law, except that adequate quantities are to be placed on the market at the going price whenever the War Production Board determines that other available supplies are insufficient to meet industrial requirements. The Army and Navy Munitions Board within 90 days after passage of the law must submit to Congress a report on the maximum and minimum amounts of these strategic items which are to be stockpiled. After a year from the time the report is submitted, the Surplus Board may authorize the disposal of any strategic items determined to be surplus. In effect, the law will keep off the market for at least 15 months, such metals as copper, zinc, lead and magnesium.

The law relieves representatives of government agencies of any personal liability in connection with surplus sales or collections of purchase prices, except in the case of fraud. In case of fraud, the government may reclaim the property and keep the purchase price paid for it, or it may cause the guilty person to be fined $2,000 for each act of fraud, plus double damages sustained by the government as a result of the fraud.

Another section of the law subject to criticism forbids any employee of a government agency handling surpluses from going to work for a private company in connection with surpluses for two years after leaving the government. This provision forced about 1,000 Army officers who had been working on surpluses to be transferred to other work at their own request. Moreover, it has hampered the efforts of disposal agencies to hire additional personnel.

The Act specifically prohibits surplus property abroad from being imported into this country. Since about half of the nation's surplus suitable for the civilian economy is said to be abroad; this will help to ease the effects of surpluses upon the nation's economy by that extent.

Helix Angles of Single Acme Threads

Based on One Half the Full Depth of Thread

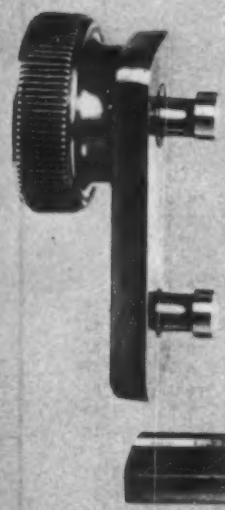
BY C. A. REIMSCHISSEL, DIRECTOR OF DIE HEADS, LANDIS MACHINE COMPANY

These helix angles are used for setting grinding wheels, milling cutters and lathe threading tools when cutting single Acme threads.

	THREADS PER INCH														
Dia.	12	11	10	9	8	7	6	5.5	5	4.5	4	3.5	3	2.5	2
¼	7°58′	8°28′	9°31′	10°52′											
5/16	5°50′	6°17′	7°11′	8°9′	9°25′										
3/8	4°41′	5°10′	5°43′	6°31′	7°30′	8°48′	10°40′								
7/16	3°56′	4°20′	4°49′	5°26′	6°14′	7°16′	8°45′								
½	3°23′	3°43′	4°9′	4°39′	5°19′	6°12′	7°25′	8°15′							
9/16	2°59′	3°16′	3°39′	4°5′	4°38′	5°24′	6°32′	7°9′							
5/8	2°39′	2°54′	3°12′	3°37′	4°7′	4°47′	5°42′	6°12′	7°2′						
11/16	2°23′	2°37′	2°54′	3°15′	3°41′	4°18′	5°6′	5°38′	6°17′	7°7′					
¾	2°11′	2°23′	2°39′	2°57′	3°26′	3°54′	4°37′	5°5′	5°41′	6°27′	7°22′	8°40′	10°29′		
13/16	2°0′	2°11′	2°25′	2°43′	3°5′	3°33′	4°13′	4°40′	5°10′	5°51′	6°42′	7°50′	9°26′		
7/8	1°51′	2°1′	2°14′	2°29′	2°50′	3°17′	3°53′	4°17′	4°45′	5°23′	6°8′	7°13′	8°38′	10°49′	
15/16	1°43′	1°53′	2°5′	2°19′	2°37′	3°3′	3°36′	3°57′	4°24′	4°58′	5°40′	6°37′	7°56′	9°57′	
1	1°36′	1°45′	1°56′	2°10′	2°27′	2°53′	3°21′	3°41′	4°5′	4°37′	5°15′	6°8′	7°14′	9°10′	
1 1/16	1°30′	1°39′	1°49′	2°2′	2°18′	2°39′	3°8′	3°26′	3°49′	4°19′	4°54′	5°43′	6°49′	8°30′	
1 1/8	1°25′	1°33′	1°45′	1°55′	2°10′	2°29′	2°57′	3°13′	3°35′	4°2′	4°36′	5°21′	6°23′	7°56′	10°24′
1 3/16	1°19′	1°28′	1°38′	1°48′	2°4′	2°22′	2°42′	3°3′	3°23′	3°49′	4°20′	5°2′	5°59′	7°25′	9°45′
1 ¼	1°16′	1°23′	1°32′	1°42′	1°56′	2°14′	2°37′	2°53′	3°12′	3°36′	4°5′	4°45′	5°39′	6°59′	9°8′
1 5/16	1°12′	1°19′	1°27′	1°37′	1°50′	2°7′	2°29′	2°44′	3°3′	3°24′	3°53′	4°29′	5°21′	6°34′	8°37′
1 3/8	1°9′	1°15′	1°23′	1°33′	1°45′	2°1′	2°22′	2°36′	2°53′	3°14′	3°40′	4°15′	5°4′	6°13′	8°8′
1 7/16	1°6′	1°12′	1°19′	1°29′	1°40′	1°56′	2°16′	2°29′	2°44′	3°5′	3°30′	4°3′	4°50′	5°55′	7°43′
1 ½	1°3′	1°9′	1°16′	1°25′	1°35′	1°50′	2°10′	2°22′	2°38′	2°57′	3°20′	3°51′	4°35′	5°38′	7°18′
1 9/16	1°0′	1°6′	1°13′	1°21′	1°32′	1°46′	2°4′	2°16′	2°32′	2°49′	3°12′	3°42′	4°23′	5°24′	6°57′
1 5/8	58′	1°3′	1°10′	1°18′	1°28′	1°41′	1°59′	2°10′	2°25′	2°42′	3°4′	3°32′	4°11′	5°9′	6°37′
1 11/16	56′	1°1′	1°7′	1°15′	1°25′	1°38′	1°55′	2°5′	2°19′	2°36′	2°56′	3°23′	4°1′	4°56′	6°21′	
1 ¾	54′	59′	1°5′	1°12′	1°22′	1°33′	1°50′	2°0′	2°13′	2°30′	2°49′	3°15′	3°51′	4°43′	6°5′
1 13/16	52′	57′	1°3′	1°10′	1°19′	1°30′	1°46′	1°56′	2°8′	2°24′	2°43′	3°8′	3°43′	4°32′	5°51′
1 7/8	50′	55′	1°0′	1°8′	1°16′	1°27′	1°42′	1°52′	2°4′	2°19′	2°37′	3°1′	3°34′	4°21′	5°37′
1 15/16	48′	53′	58′	1°5′	1°14′	1°24′	1°39′	1°48′	1°59′	2°14′	2°32′	2°55′	3°27′	4°12′	5°25′
2	47′	51′	56′	1°3′	1°11′	1°21′	1°36′	1°44′	1°55′	2°10′	2°27′	2°48′	3°20′	4°4′	5°13′
2 1/16	45′	48′	53′	59′	1°7′	1°17′	1°30′	1°38′	1°49′	2°2′	2°17′	2°38′	3°6′	3°48′	4°54′
2 1/8	42′	45′	50′	56′	1°3′	1°13′	1°24′	1°32′	1°43′	1°55′	2°11′	2°29′	2°56′	3°33′	4°34′
2 3/16	40′	43′	47′	53′	1°0′	1°9′	1°20′	1°28′	1°37′	1°48′	2°2′	2°21′	2°46′	3°21′	4°18′
2 ¼	37′	41′	45′	50′	57′	1°5′	1°16′	1°23′	1°32′	1°43′	1°56′	2°13′	2°37′	3°10′	4°3′
2 5/16	35′	39′	43′	47′	54′	1°2′	1°13′	1°19′	1°27′	1°37′	1°50′	2°7′	2°28′	3°1′	3°51′
2 3/8	34′	37′	41′	45′	51′	59′	1°9′	1°15′	1°23′	1°33′	1°45′	2°1′	2°20′	2°52′	3°38′
2 7/16	32′	35′	39′	43′	49′	56′	1°6′	1°12′	1°19′	1°29′	1°40′	1°55′	2°15′	2°44′	3°29′
3	31′	34′	37′	41′	47′	53′	1°3′	1°9′	1°16′	1°25′	1°36′	1°50′	2°9′	2°37′	3°19′
3 1/16		33′	36′	40′	45′	52′	1°0′	1°6′	1°13′	1°21′	1°32′	1°46′	2°3′	2°30′	3°11′
3 1/8		31′	34′	38′	43′	50′	58′	1°3′	1°10′	1°18′	1°28′	1°41′	1°57′	2°24′	3°3′
3 3/16		30′	33′	37′	42′	48′	56′	1°1′	1°7′	1°15′	1°24′	1°37′	1°53′	2°19′	2°56′
3 ¼		29′	32′	36′	40′	46′	54′	59′	1°4′	1°12′	1°21′	1°33′	1°49′	2°13′	2°48′
3 5/16			31′	35′	38′	45′	52′	56′	1°2′	1°9′	1°18′	1°30′	1°44′	2°8′	2°42′
3 3/8			30′	33′	37′	43′	50′	54′	1°0′	1°7′	1°16′	1°27′	1°39′	2°3′	2°36′
3 7/16			29′	32′	36′	42′	49′	53′	59′	1°5′	1°13′	1°24′	1°37′	1°59′	2°31′
4			28′	30′	35′	41′	47′	51′	57′	1°3′	1°11′	1°21′	1°34′	1°55′	2°26′
4 1/16					33′	39′	44′	48′	53′	1°0′	1°7′	1°16′	1°29′	1°49′	2°17′
4 1/8						36′	41′	45′	50′	56′	1°3′	1°11′	1°24′	1°42′	2°9′
4 3/16							39′	43′	47′	53′	1°0′	1°7′	1°20′	1°37′	2°0′
5								41′	45′	50′	56′	1°4′	1°16′	1°31′	1°55′
5 1/16									43′	48′	54′	1°1′	1°12′	1°27′	1°49′
5 1/8										45′	51′	58′	1°8′	1°23′	1°44′
5 3/16										43′	49′	55′	1°6′	1°19′	1°40′
6										41′	47′	53′	1°3′	1°15′	1°35′

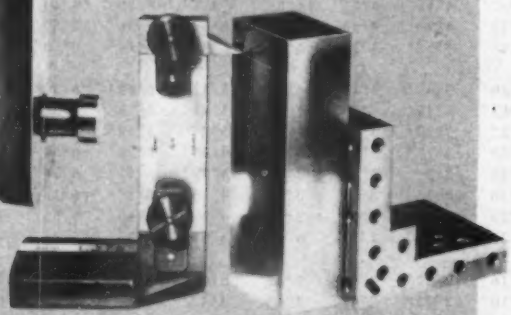
WEBBER *Announces*

The Heavy Duty GAGE SET

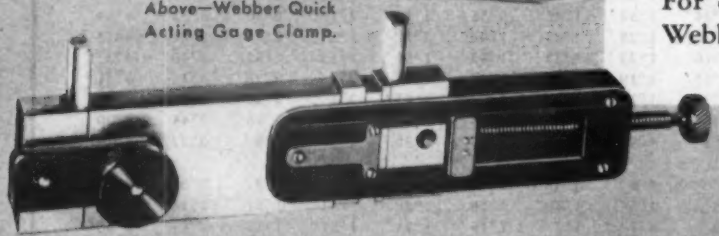


Left—Webber Eccentric Clamp used to unite several blocks quickly into one solid, accurate gage.

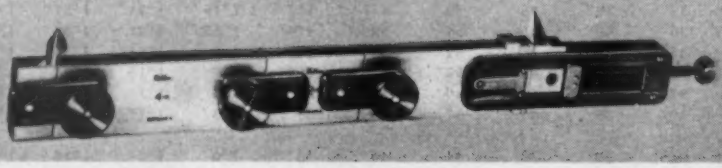
Below—Short height gage build up using the scriber point and base block assembly to lay out die work.



Above—Webber Quick Acting Gage Clamp.

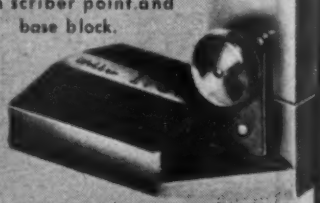


Above—Illustrates method of assembling internal measuring jaws to check a hole—an inside or outside micrometer.



Below—Illustrates the build up of a precision divider with gage block accuracy.

Right—A typical example of a built-up height gage with scriber point and base block.



THE MOST USEFUL SET OF GAGE BLOCKS EVER DEVELOPED

Here's a set of gages made to order for the tool and die maker and machine tool operator bringing him a practical method for obtaining dependable precision measurements in millionths of an inch.

With this set, you can build up instantly precision instruments for checking inside and outside diameter measurements—scriber point with accurate base block assembly for laying out die work—a precision divider of various radii with gage block accuracy—height gages made up of precision Webber gage blocks for exceptionally close tolerance work.

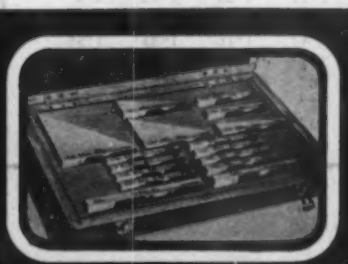
The use of Webber Eccentric Clamp and Quick Acting Gage Clamp permits quick—accurate assembly of precision gage blocks for precision measurements of all kinds within the working range of the set.

Webber offers two ranges of Heavy Duty Gage Sets:

No. 24—Range from .300" to 24.000" in steps of .0001"

No. 36—Range from .300" to 36.000" in steps of .0001"

For detailed description, write for the Webber Heavy Duty Gage Set bulletin.



Webber GAGE COMPANY

12901 TRISKETT RD. • CLEVELAND 11, OHIO

Helix Angles of Double Acme Threads

Based on One Half the Full Depth of Thread

BY C. A. REIMSCHISSEL, DIRECTOR OF DIE HEADS, LANDIS MACHINE COMPANY

These helix angles are used for setting grinding wheels, milling cutters and lathe threading tools when cutting double Acme threads.

	THREADS PER INCH														
Dia.	12	11	10	9	8	7	6	5.5	5	4.5	4	3.5	3	2.5	2
1/4	15°38′	16°35′	18°32′	21°0′											
5/16	11°33′	12°25′	14°9′	15°59′	18°21′										
3/8	9°18′	10°15′	11°20′	12°52′	14°45′	17°12′	20°39′								
7/16	7°50′	8°37′	9°34′	10°46′	12°19′	14°18′	17°7′								
1/2	6°45′	7°25′	8°16′	9°14′	10°33′	12°15′	14°36′	16°7′							
9/16	5°57′	6°31′	7°16′	8°6′	9°13′	10°43′	12°54′	14°5′							
5/8	5°17′	5°47′	6°23′	7°12′	8°11′	9°30′	11°17′	12°16′							
11/16	4°46′	5°13′	5°47′	6°29′	7°22′	8°33′	10°8′	11°10′							
3/4	4°22′	4°45′	5°17′	5°53′	6°42′	7°46′	9°11′	10°5′	11°16′	14°7′	14°30′	16°57′	20°34′		
13/16	4°0′	4°22′	4°50′	5°25′	6°9′	7°4′	8°23′	9°16′	10°15′	12°52′	13°13′	15°23′	18°23′		
7/8	3°42′	4°2′	4°28′	4°57′	5°39′	6°32′	7°43′	8°31′	9°34′	11°46′	12°8′	14°13′	17°2′	20°55′	
15/16	3°26′	3°46′	4°10′	4°37′	5°14′	6°5′	7°10′	7°52′	8°45′	10°54′	11°12′	13°4′	15°34′	19°20′	
1	3°12′	3°30′	3°52′	4°20′	4°53′	5°45′	6°41′	7°20′	8°9′	10°9′	10°25′	12°8′	14°16′	17°53′	
1 1/16	3°0′	3°18′	3°38′	4°4′	4°36′	5°17′	6°15′	6°50′	7°37′	9°34′	9°44′	11°19′	13°27′	16°38′	
1 1/8	2°50′	3°6′	3°30′	3°49′	4°20′	4°57′	5°53′	6°25′	7°9′	8°55′	9°8′	10°37′	12°37′	15°35′	20°9′
1 3/16	2°40′	2°56′	3°16′	3°36′	4°8′	4°43′	5°23′	6°5′	6°44′	8°25′	8°37′	9°59′	11°50′	14°36′	18°58′
1 1/4	2°32′	2°46′	3°4′	3°24′	3°52′	4°28′	5°13′	5°45′	6°22′	7°58′	8°7′	9°26′	11°11′	13°46′	17°49′
1 5/16	2°24′	2°38′	2°54′	3°14′	3°40′	4°14′	4°57′	5°27′	6°5′	7°32′	7°42′	8°55′	10°37′	12°58′	16°52′
1 3/8	2°18′	2°30′	2°46′	3°6′	3°30′	4°2′	4°43′	5°11′	5°45′	7°10′	7°19′	8°27′	10°3′	12°17′	15°57′
1 7/16	2°12′	2°24′	2°38′	2°58′	3°20′	3°52′	4°32′	4°57′	5°27′	6°49′	6°59′	8°4′	9°37′	11°43′	15°10′
1 1/2	2°6′	2°18′	2°32′	2°50′	3°10′	3°40′	4°19′	4°43′	5°15′	6°29′	6°39′	7°40′	9°10′	11°9′	14°22′
1 9/16	2°0′	2°12′	2°26′	2°42′	3°3′	3°32′	4°8′	4°32′	5°3′	6°13′	6°23′	7°22′	8°45′	10°42′	13°42′
1 5/8	1°56′	2°6′	2°20′	2°36′	2°56′	3°21′	3°58′	4°20′	4°50′	5°57′	6°6′	7°3′	8°19′	10°13′	13°4′
1 11/16	1°52′	2°2′	2°14′	2°30′	2°49′	3°16′	3°49′	4°10′	4°38′	5°43′	5°51′	6°45′	8°0′	9°48′	12°33′
1 3/4	1°48′	1°58′	2°10′	2°24′	2°44′	3°6′	3°40′	4°0′	4°25′	5°29′	5°37′	6°29′	7°40′	9°22′	12°2′
1 13/16	1°44′	1°54′	2°6′	2°20′	2°38′	3°0′	3°32′	3°52′	4°15′	5°19′	5°25′	6°15′	7°23′	9°1′	11°35′
1 7/8	1°40′	1°50′	2°0′	2°16′	2°32′	2°54′	3°24′	3°44′	4°8′	5°7′	5°14′	6°1′	7°6′	8°39′	11°8′
1 15/16	1°36′	1°46′	1°56′	2°10′	2°28′	2°48′	3°18′	3°36′	3°58′	4°57′	5°3′	5°49′	6°53′	8°21′	10°44′
2	1°34′	1°42′	1°52′	2°6′	2°22′	2°42′	3°12′	3°28′	3°50′	4°46′	4°48′	5°35′	6°39′	8°6′	10°21′
2 1/16	1°30′	1°36′	1°46′	1°58′	2°14′	2°34′	3°0′	3°16′	3°34′	4°29′	4°33′	5°15′	6°11′	7°34′	9°44′
2 1/8	1°24′	1°30′	1°40′	1°52′	2°6′	2°26′	2°48′	3°4′	3°26′	4°14′	4°22′	4°57′	5°51′	7°4′	9°5′
2 3/16	1°20′	1°26′	1°34′	1°46′	2°0′	2°18′	2°40′	2°56′	3°14′	4°0′	4°4′	4°41′	5°31′	6°40′	8°33′
2 1/4	1°14′	1°22′	1°30′	1°40′	1°54′	2°10′	2°32′	2°46′	3°4′	3°48′	3°52′	4°26′	5°12′	6°19′	8°4′
2 5/16	1°10′	1°18′	1°26′	1°34′	1°48′	2°4′	2°26′	2°38′	2°55′	3°34′	3°40′	4°14′	4°56′	6°1′	7°40′
2 3/8	1°8′	1°14′	1°22′	1°30′	1°42′	1°58′	2°18′	2°30′	2°46′	3°26′	3°30′	4°2′	4°40′	5°43′	7°14′
2 7/16	1°4′	1°10′	1°18′	1°26′	1°38′	1°52′	2°12′	2°24′	2°39′	3°14′	3°20′	3°50′	4°30′	5°27′	6°57′
3	1°2′	1°8′	1°14′	1°22′	1°34′	1°46′	2°6′	2°18′	2°32′	3°6′	3°12′	3°40′	4°18′	5°13′	6°37′
3 1/16		1°6′	1°12′	1°20′	1°30′	1°44′	2°0′	2°12′	2°26′	3°0′	3°4′	3°32′	4°6′	5°0′	6°21′
3 1/8		1°2′	1°8′	1°18′	1°26′	1°40′	1°56′	2°6′	2°20′	2°52′	2°56′	3°22′	3°54′	4°48′	6°5′
3 3/16		1°0′	1°6′	1°14′	1°24′	1°36′	1°52′	2°2′	2°14′	2°46′	2°48′	3°14′	3°46′	4°38′	5°51′
3 1/4		58′	1°4′	1°4′	1°20′	1°32′	1°48′	1°58′	2°8′	2°40′	2°42′	3°6′	3°38′	4°26′	5°35′
3 5/16				1°2′	1°16′	1°30′	1°44′	1°52′	2°4′	2°34′	2°36′	3°0′	3°29′	4°16′	5°23′
3 3/8					1°14′	1°26′	1°40′	1°48′	2°0′	2°28′	2°32′	2°54′	3°18′	4°6′	5°11′
3 7/16					1°12′	1°24′	1°38′	1°46′	1°57′	2°22′	2°26′	2°48′	3°14′	3°58′	5°2′
4					1°10′	1°22′	1°34′	1°42′	1°54′	2°18′	2°22′	2°42′	3°8′	3°50′	4°51′
4 1/4								1°36′	1°46′	2°10′	2°14′	2°32′	2°58′	3°38′	4°33′
4 1/2								1°30′	1°40′	2°2′	2°6′	2°22′	2°48′	3°24′	4°17′
4 3/4								1°26′	1°34′	1°56′	2°0′	2°14′	2°40′	3°14′	4°0′
5								1°22′	1°30′	1°50′	1°52′	2°8′	2°32′	3°2′	3°50′
5 1/4									1°26′	1°46′	1°48′	2°2′	2°24′	2°54′	3°38′
5 1/2										1°40′	1°42′	1°56′	2°16′	2°46′	3°28′
5 3/4										1°36′	1°38′	1°50′	2°12′	2°38′	3°20′
6										1°32′	1°34′	1°46′	2°6′	2°30′	3°10′

AMPCO
TOOLS
AS ONE OF OUR NEW CUSTOMERS SO ABLY PUT IT . . . . . "I HAVE CROSSED OUT ONE OF OUR HOME FRONT ENEMIES. . . TOOL TROUBLE . BY USING AMPCO HAMMER FORGED POLISHED FLUTE DRILLS"
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Gaging Business

Last Plane Cut

The W-12 airplane program instituted on October 15, 1944, is reported to involve only a six percent cut in weight of the total plane program. It is reported that this just about winds up the cuts in aircraft output that had been earlier planned for the end of the war with Germany. The continuation of the war for several months beyond earlier estimates that had been set by responsible officials has permitted fulfillment of certain plane requirements and the institution of several slashes in production in recent months. It is now revealed that reductions in the plane program since the first of the year amount to a combined 40 percent slash in the original 1944 schedule.

Absenteeism Again Appears

Aside from spasmodic strikes and continuing labor shortages, the War Manpower Commission reports an alarming increase in absenteeism at critical war plants. This new wave of absenteeism is attributed by WMC to worker over-optimism over the course of the war.

With heavy artillery facilities almost completely set up, aided by return of some lend-lease equipment from Great Britain and Australia, heavy manning schedules will have to be met. The heavy artillery program for 4.5 in. shells calls for a 135 percent increase in monthly output, for 8 in. shells a 120 percent rise, and for 240 mm. howitzers a 75 percent jump.

Manpower Hampers Rockets

The rocket ammunition program is running into labor trouble, particularly at the powder and loading plants. Manpower needs of such plants total 10,000 workers, and unless they are met, the whole rocket situation will be hopelessly bottlenecked. There is no problem on production of launchers and rocket parts, which are reported to be ahead of schedule.

The expanded tank program is running into labor shortages, too, with plants producing the M-36 tank destroyer and the modified medium tank experiencing difficulty on this score. Requirements are set at only about 2,000 men, but the plants involved are located in critical labor areas. As a result, some transfers of labor from other war work to tanks in the plants involved will help relieve the situation.

These high spots in the labor situation serve to explain the War Manpower Commission's opposition to reconversion of American industry to civilian production. Government officials feel that too much publicity has been given cuts in war production and not enough to the new contracts that have been substituted and the program increases that have been made.

Spot Authorizations Small

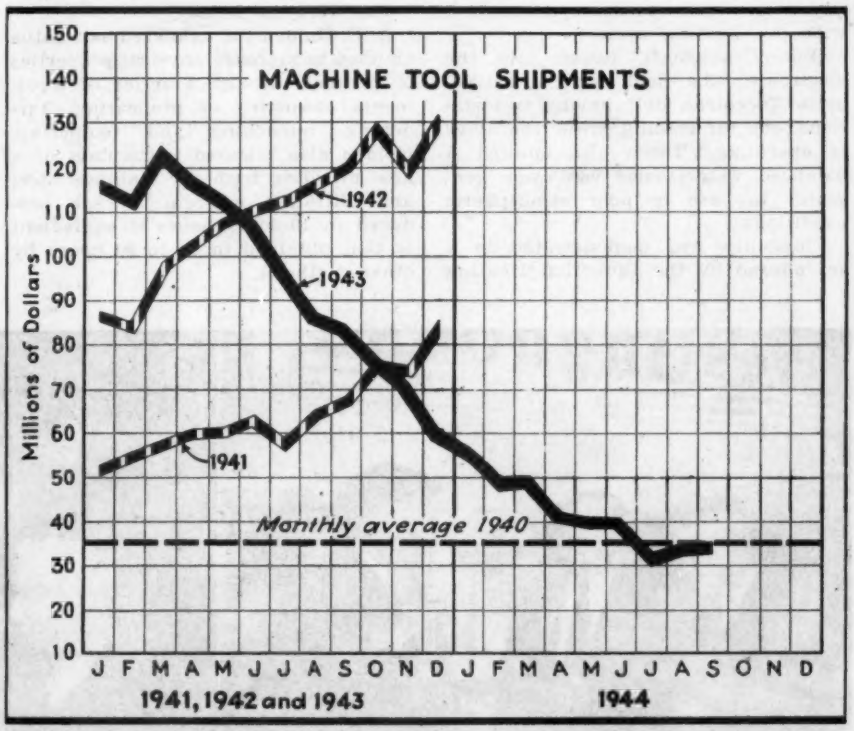
Thus far, the bulk of "spot authorizations" that have been turned down have been rejected by the War Manpower Commission, and many of them were made by firms in "easy" labor areas. Moreover, WPB's Chairman Krug has said that "spot authorizations" may "get slower" due to lagging war production.

Up through October 24th, 1,278 "spot authorizations" for civilian production had been granted, while 340 other applications had been turned down. The total amount of civilian goods authorized was $202,428,000, of which $79,600,000 was scheduled to be produced during the current quarter of 1944 and the balance over the first three quarters of 1945. That is only a drop in the bucket of American industrial production, as may be indicated by the fact that it only involves about 12,000 workers.

The lag in authorizations is indicated by the fact that only about 15,000 tons of steel had been approved for production authorized in the current quarter, although over 200,000 tons of steel had previously been set aside for this use during the quarter. There are still over 2,000 applications that have not yet been acted on.

Auto Tool Outlook Gloomy

The WPB's move to lighten the automobile industry's difficulties in securing machine tools for reconversion will be of doubtful aid. The amendment to the E-1-b Order frees from priorities the 25 percent of the tool industry's output allocated for non-military users. Only exception to this will be made when ratings will be assigned to plants facing a critical bottleneck unless a few key tools are secured. This development means that the auto industry's orders will stand equal chance of delivery with requirements of other industries and foreign orders. However, auto makers report that delivery promises on many tools are for after March 1, 1945. Some big presses will take seven or eight months to build.



Orders Drop 15 Percent— Due to reduced military orders, incoming orders for machine tools were down 15 percent to $36,959,000 for September, 1944, from the August level of $43,459,000, whereas cancellations rose to $3,946,000 from $2,238,000 in August. Continuing manpower shortages held September shipments close to August levels. At $35,876,000, September shipments were up two percent from August's $35,177,000. Declining new orders and rising cancellations dropped the backlog to $193,682,000 from $196,760,000 at the end of August.

War-Born Processes and Materials on Display at the Metal Show

Record crowd looked for postwar possibilities in new methods and metals. Keen interest shown in induction heating, shot peening, electronic inspection, salt hardening and battery welders

CLEVELAND — Elaborate display booths were noticeable by their absence at the National Metal Exposition, held at the Cleveland Public Auditorium, October 16 to 20. The large steel companies and many of the big welding equipment suppliers have eased out of the show during the war years. Their places have been taken by small businesses which swelled the total displays to 442 and attendance to more than 40,000, both records for this event.

Induction heating "stole" the show. At least eight concerns previously in the field and one newcomer gave dramatic displays of the quick-heating of metal parts without contact with any visible source of energy. American Type Founders threw its hat into the ring with a line of spark-gap machines to accommodate conveyor or slide feeds synchronized with the heating cycle.

Ohio Crankshaft moved into the electronic tube field with a 450,000-cycle Toccotron unit having two stations, one for loading, while the other is operating. Tocco also showed a balanced water-cooled 9600-cycle generator for use in poor atmospheric conditions.

Flexibility was demonstrated in a set offered by the Induction Heating Corp. which had a coaxial equalizer for coupling two 20-kilowatt machines when the additional capacity is needed for a specific job.

By and large, furnace builders contended themselves with exhibiting equipment that has been on the market for the past year or two. An exception was American Gas Furnace which showed a rotary gas carburizer designed especially for bearing balls and small parts. A novel neck design for the retort permits support in roller bearings that need no lubrication.

Salt-bath equipment continues to make news. Ajax Electric revealed an Isothermal process hitherto used on secret war work, but now available to give physical properties which were formerly obtainable only in the laboratory. Items treated by the process —fuze components and machine gun bolts—were on display.

A. F. Holden Co. exhibited salt baths claimed to increase physical properties 50 percent through a series of treatments consisting of preheating, hardening, quenching and tempering. Holden also released particulars of a new nitriding bath for stainless steel and Nitralloy wherein a case produced in 10 to 20 hours is equivalent to that obtained in 80 to 90 hours by other methods.

William C. Dunn, president, The Ohio Crankshaft Co., was on hand to demonstrate Tocco's new equipment

To open new possibilities in the cold treatment of alloy steels, expansion fits and metallurgical research, Kold Hold brought out an electric refrigerating equipment capable of temperatures to 150 F. below zero.

A noticeable trend was reflected in the number of inspection devices which have been stimulated by the exacting requirements of the armed services during the war and which will, no doubt, carry over to post-

H. H. Sugg, heating appliance engineer, J. H. Germany, manager, heating section, and Alan F. Snow, heating engineer, all of Westinghouse, discuss postwar heat-treating problems at the Company's booth

John Cetrule, president, Triplex Machine Tool Co., N. Walker, president, Ultra Lap Machine Co. and Nicholas Cetrule, Triplex vice-president, were found admiring a new multi-spindle machine intended for production lapping

R. T. Roberts, technical advisor, Detroit Div., W. G. Seidlitz, plant mgr., Ordnance Div., and Lester W. Morrell, asst. sales mgr., Magnesium-Aluminum Div., at Revere Copper & Brass booth

W. A. Hakin, consulting engineer, A. S. Gould, Cleveland representative, and A. F. B. Thompson, chief engineer, Michigan Steel Casting Co., were busy at their company's exhibit

war applications. Industrial X-ray, for example, was displayed in many new types of equipment particularly designed for the industrial user. Some of these units are arranged for the rapid handling of small parts, while convenient portable units were in evidence for use on large castings and welded assemblies.

North American Phillips Co. displayed two models of its Searchray unit for X-ray analysis, designed for use by inexperienced operators. These units are adapted for fluoroscopic examination of light alloys and the making of radiographs. A portable X-ray inspection unit offered by the Kelley-Koett Manufacturing Co. can be mounted on a crane, a hand truck or in a radiographic cabinet. Here again ease of operation is emphasized.

A new application of X-ray is for gaging the thickness of metal foil to accuracies of four millionths of an inch. Such a unit was offered by the Standard Electronics Research Corp. A modification of the same principle is employed to inspect cable electronically to determine the concentricity of the conductor with respect to its surrounding installation.

The cathode-ray screen has been adapted to the examination of metal parts in determining such characteristics as depth of carburization, chemical analysis, internal stresses, heat-treatment or thickness of plating. The Du Mont Cyclograph rejects parts automatically when they do not conform to specifications.

As the result of its work in aircraft development, the Glenn L. Martin Co. has developed an instrument which uses the cathode-ray oscillograph for dynamic measurements. Postwar applications of this device may determine the riding qualities of motor vehicles, measurement of critical stresses in steel structures, studies of machinery subjected to rapidly alternating pressures and to the shop mounting of electronic equipment.

The Struthers-Wells Corp. offered an electronic flame-cutting machine in which the contour of a plate cut by a gas torch is determined by plastic control records. The operation is similar to that of a phonograph. Four identical plates may be cut at one time through use of this equipment.

The Progressive Welder Co.'s booth concentrated on storage battery resistance welding. Both spot welding and seam welding units were shown with refrigerated electrodes. This development was made possible by the improvement in storage batteries made for military use during the war. Use of the battery is claimed to lower current consumption, reduce peak line demands and greatly simplify resistance welding controls.

Mark Graves, manager, Cleveland Tapping Machine Co., put his company's latest tapper through its paces

A new high-strength aluminum alloy containing zinc and magnesium was announced by the Aluminum Co. of America. This alloy, known as 75S, is now available only in the form of extrusions and Alclad sheets. Its endurance limit is the highest of any of the wrought aluminum alloys.

Reynolds Metals Co. disclosed the development of two high-strength aluminum alloys R301 and R303, which have been used in the construction of airplanes. R301 consists of a high-strength alloy clad with a medium-strength corrosion-resistant alloy. Alloy R303 is a similar sheet alloy having still greater strength.

Growing interest in the use of shot-blast equipment for surface peening to add strength and fatigue resistance was evidenced by the fact that three major producers of shot-blasting equipment, Pangborn Corp., American Foundry Equipment Co. and W. W. Sly Mfg. Co. exhibited equipment arranged for this purpose. Blast peening machines throw steel balls against the work, either by the air blast or by the airless centrifugal method. Shot reclaiming and cleaning units are generally included in installations.

The Andrew C. Campbell Div., of the American Chain and Cable Co., announced the development of a completely automatic abrasive cutting machine. The first of this line is the Model 700 Campbell Autocutter, suitable for cutting tungsten and solid steel up to ⅝ in. diameter. Approximately 20 to 50 pieces of stock can be cut per minute.

U. S. Board of Trade May Guide Postwar Foreign Trade

Practical government officials and New Dealers are poles apart on postwar trade policies for tariffs, cartels, and government buying. White House sponsors Board of Trade plan

WASHINGTON—Government officials are formulating several plans for putting post-war foreign trade under close government supervision. One plan would have the government doing all foreign buying and selling for American industry in competition with similar practices abroad. Another plan, sponsored by New Dealers, would set American industry in competition with foreign government in a free world market relieved of cartel and monopoly influences. However, the plan with greatest White House sponsorship involves the establishing of a U. S. Board of Trade, which would help close export and import arrangements for industry.

Board of Trade Plan

The Board of Trade plan would call upon leaders of various industries to advise the government on bilateral trade agreements involving reciprocal trade concessions. Operations abroad would be within the realm of existing practical international agreements or cartels on sugar, cotton, tin, and rubber, with sharp restrictive practices to be eliminated as far as possible without injuring the position of marginal producers of such commodities.

The sponsors of "State Buying" would have all foreign trade channel through the government. They hold this to be a logical development for two reasons: (1) because other nations are already engaged in nationwide transactions being handled by their governments; and (2) because this would be the only satisfactory substitute for eliminating international cartels.

Cartel Problem Difficult

Many government officials agree that "cartels" should be broken up, but the extent of such action finds divided opinions. Some New Dealers hold that cartels should be entirely eliminated by use of the full pressure of American power on world markets. They hold that even the breaking up of the International Tin Cartel could not harm Bolivia much, since that nation could turn from mining to farming over a period of years. Similar world-changing plans are extended to other nations which might be harmed by the dissolution of cartels, with the usual solution offered being the upsetting of their normal economy.

The New Dealers are already sponsoring programs to industrialize most of Latin-America, a plan which is also supported by more conservative government officials. However, the New Dealers expect all tariffs to be removed, and then have free trade influence the economy of all nations. They are prepared to accept a lowering of American standards of living to achieve this level. They would set up floors on wages all over the world, but allow prices to seek their own level. Moreover, they expect to break up the British diamond monopoly and British preferential trade agreements with its Dominions.

More realistic government sources expect to see the elimination of most, but not all, cartels, and the lowering of many tariffs but only in return for reciprocal concessions by other nations. This same school of thought believes that "State Buying" is inevitable for commodities, but that it wouldn't work on manufactured goods.

Theories on lend-lease, foreign credits, and surplus disposal abroad are as far apart as general trade plans. Thus, with the end of the war in Europe drawing to a close, American foreign trade policy is clouded by idealistic theories which might prove successful in a vacuum. A further bone of contention at this time is jurisdiction over postwar trade as between the State Department, the Foreign Economic Administration, and the Bureau of Foreign and Domestic Commerce.

HORACE GREELEY, 1945: "GO WEST AND SOUTH"

WASHINGTON—If a group of Southern and Western Senators have their way a lot of people in the North and Northeastern States are going to have to move either West or South. These Senators, long on sectionalism but short on American history and economics, comprise the Special Committee to Investigate the Centralization of Heavy Industry in the United States. The Committee has found that the centralization of American industry in 11 Northern and Northeastern States is "evil" and "the greatest destructive force of free enterprise in the world."

In its report, "A Graphic Guide to Decentralization," the Committee concludes, "a program of decentralization with an important shift of population westward and the development of new industrial centers in the West, would provide the Middle Western States with new and far better balanced continental markets both for agricultural products and the mass-produced goods." People who live in Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Ohio, Michigan, Illinois, Delaware and Maryland are to make their plans accordingly.

To help this movement, the Senators propose that $6,610,000,000 worth of government-owned plants and facilities in these states should be shut down after the war. These facilities, say the Senators, should not be offered for sale, unless the purchasers are ready to scrap an equal amount of existing privately owned facilities.

DONALD NELSON MAY GET BOARD OF TRADE POST

WASHINGTON—The big job Donald Nelson, former WPB head, is reported to be waiting for here is that of head of a new U. S. Board of Trade to supervise foreign trade matters for American industry. Nelson will head this group to be set up comprised of a leading Army officer and several businessmen to help guide foreign trade policies on tariff changes, credits, and other international agreements. The plan involves regular consultation by the Board with representatives of the industries involved in particular foreign trade matters.

Serious Decline in Coast Labor Force Threatened

LOS ANGELES—Migration of workers from the Coast back to the midwestern and southern areas from which they came has been increasing for some time, and the total flow of population from this cause is now estimated at more than 25,000 per month. Moreover, surveys of war plant workers recently conducted in Los Angeles show that whereas last February some 85 percent of those who had recently migrated into the area intended to remain permanently, now not more than 75 percent have such plans. These same surveys show that more than 70 percent of housewives who are now working intend to "quit" when the war is over.

If, as may be expected, migration from the area, switching from war work, and quitting by "marginal" workers, are all accelerated by V-E day, the West may be in worse shape, employment-wise, than it has ever been.

Inside Detroit

Emergency Reconversion Plans

Continuing a trend which began over a month ago government and industrial circles here are drawing continually closer together on the issue of shelving readymade reconversion programs for split-second issuance at the break of V-E day. September's premature optimism about an early victory over Germany has apparently realized and broadened the mutual understanding of government agencies and representatives of the automotive and other industries.

While the fever lasted, the agencies were jolted into more acute awareness of the censure to which they would be exposed if inadequate planning and preparations on their part allowed peace to catch industry with its plants down. Then, when early-victory hopes faded, impatient industry spokesmen were forced into tacit agreement with the W.P.B. plea that reconversion planning was still dwarfed by the war with Germany. The results: government agencies have taken steps to prepare industry for the quickest possible reconversion after V-E day—steps advised by industry spokesmen; and industry on its own is even outdoing the agencies in pointing out that winding up the German conflict is the big job for the present.

Program Pattern Set

This atmosphere of universal amity, however, still conceals several aching bones of contention. Everyone is in agreement only on the pattern preconversion must folow.

It is, analyzed:

1) All leadtime work for civilian production such as drawing up of designs and specifications sheets, building of indispensable machines, etc.—shall be done as soon as is possible without interfering with urgent war production.

2) Final specific plans for individual plant clearance, surplus disposal, installation of new machinery and other V-E or termination day functions shall be made in full and shelved, ready for use at a moment's notice. With these plans, of course, will be shelved others for the completion of any leadtime work impossible to finish before V-E day.

Delivery Promises Extended

Apparently automotive companies have only been able to get delivery promises for 50 to 60 per cent of the machine tools needed for reconversion. In some classes of machinery the problem is even worse. Delivery promises on presses, for example, are averaging only 10 per cent. One company, ordering 80 presses, was promised a total delivery of only 4 next June, July and August.

Automotive opinion is still inflamed against what it calls "piece-meal action" on the part of government agencies. They are also annoyed by the tendency of the agencies to announce some important step in the papers and then not take it until weeks or even months later. Often, too, they say, the step turns out to be only half what was announced in the release. And sometimes it is never taken at all or means nothing when it is taken because it conflicts with some other regulation issued by that or another agency.

War Production Lagging

By way of answer the WPB points to the unfortunate facts of current war production. In the first nine months only 56 per cent of the airborne radar and 58 per cent of the heavy ammunition scheduled for 1944 have been produced. The heavy truck program has fallen back sharply. At the same time new large orders for infantry arms, especially 60 mm. and 81 mm. mortars, are being placed. Tank orders are being stepped up as a result of the discovery that it takes three rather than two tanks at the front to keep one in operation.

The army is frankly discouraged at the slow progress being made in the war against Germany and alarmed at all the reconversion conversation and publicity and the fact that industry is so far behind on so many "must" programs.

Under the circumstances, WPB repeats, a little more thought about the war and less about reconversion is in order. On the other hand, the regional office here has shown a desire to get at the bottom of the problems of the automotive industry. The chief automotive companies in this area have been interviewed individually with a view to mapping out solutions for the specific problems of each. That, the industry concedes, is a move in the right direction.

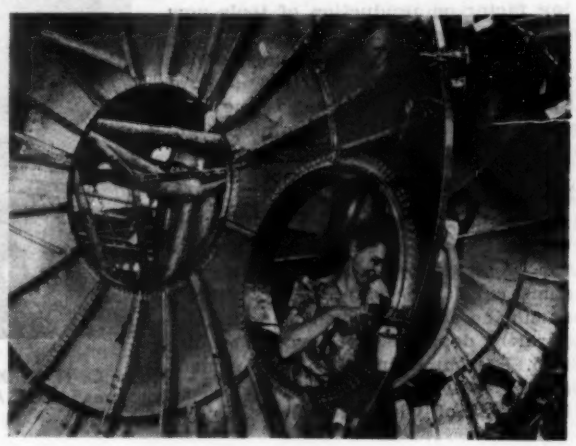
Farm Machinery Makers Develop Postwar Units for Cotton

CHICAGO—Farm machinery manufacturers have developed plans for postwar exploitation of the southern market for cotton crop machinery, eliminating cotton as the last major hand-labor crop on American farms. This fall, the first commercial cotton acreage raised entirely by machinery was the 28-acre harvest at the Hopson Planting Company's plantation near Clarksdale, Mississippi.

Although this 2,000-acre plantation has long been used by International Harvester to develop cotton-crop machinery, this season 28 acres were set aside for experimental machine production of the white staple. Here, the difficulty of machine planting cotton was solved. In machine planting a peachlike fuzz on cottonseed causes the seeds to ball together, drop out of the machine in bunches, and thus require field hands to hoe, or chop out, the surplus plants. The Hopsons ran the cottonseed through a process to remove the fuzz so that the delinted seed can be machine-planted one at a time.

New Pickers Announced

But another development in the cotton machinery field has been the announcement of Allis-Chalmers Manufacturing Company that it has built two experimental Rust cotton pickers, the first such machine claimed as successful. The two pickers were built at Allis-Chalmers' La Porte, Indiana, works under license and supervision of John D. Rust, who, with his brother, Mack, invented the machine. How these machines work out in the cotton fields this fall may determine Allis-Chalmers' future connection with the Rust Brothers, who have lacked capital to develop their machine. The experimental units are the two-row type developed to operate on Allis-Chalmers two-plow tractors



Pinwheel Fixture—The pinwheel idea is used to speed production of sections of B-29 bulkheads, shaped like slices of pie at a Detroit plant of the Hudson Motor Car Co. The vertical rotating positioner saves floor space and makes work accessible to even short women riveters

N. M. T. B. A. Studies Its Reconversion Responsibility

Key industry fears government restrictions may "bottleneck" peacetime employment. Surplus disposal and postwar problems also discussed. Trecker becomes association president

HOT SPRINGS, VA.—Pledging its utmost efforts to supply on schedule all machines still required for war production, the 43rd annual meeting of the National Machine Tool Builders Association, Oct. 19-20, devoted major attention to reconversion problems. Government officials, machine tool users, and builders of machine tools, discussed the problems and responsibilities of this key industry in the approaching postwar era.

"Unless government releases its restrictions on our production of machines for peacetime purposes, we may, within six months, be accused of being the bottleneck to peacetime employment," said James Y. Scott of Van Norman Co. in his address as president of the association. He pointed out that speed in reconversion is essential to avoid a deep dip in employment, that machine tools are the vital factor in re-equipping, that there are many key machines, requiring months to build, which the automobile industry, for example, needs now if it is to effect a quick conversion from war to peace. He urged that governmental attitude be changed, to allocate manpower for the production and delivery of such machines as are required to "win the peace."

John Chafee, director of tools division, War Production Board, stated that the urgency of release on reconversion tools is recognized in WPB. Builders may now deal with buyers on unrated orders, and delivery dates which can be met without delaying war needs should be presented to WPB offices, for possible future clearance, particularly for machines critically needed for the return to peacetime goods. It is hoped at WPB to eliminate ratings of orders gradually but steadily, the most serious retarding factor on production of tools now being component parts.

Disposition of government surplus machines was discussed by several speakers. Mason Britton, of the Surplus War Property Administration, said the planning of all disposal methods was giving consideration first to speed, and second to recovering the maximum amount for the government without crippling industry in the postwar period. Stockpiling of some surplus or scrap raw materials should be adopted, when price is temporarily depressed, to avoid speculation. Present estimates of government owned tools which may be released is 600,000, of which few have as yet been declared surplus.

Domestic prospects for major sales effort was set up by Walter K. Bailey, vice-president, The Warner & Swasey Co., in his address on "New Selling Problems." Government-owned tools represent a great opportunity to get out of our shops and onto the junk heap all ancient and obsolete and high-cost machines. Builders' sales organizations should promote the purchase of this surplus equipment wherever it was adequate, selling at the same time new machines where production conditions required them. Such a thorough modernization of our entire metal-working industry would insure the low costs essential for successful competition with other countries and still maintain our high standards of living and high-level employment. In addition, Mr. Bailey predicted an active market for machine tools to equip new industries and expand established ones.

Foreign markets and marketing methods were discussed by John Abbink, vice-president, McGraw-Hill Publishing Co. Taking a long-term

New Officers of National Machine Tool Builders' Association

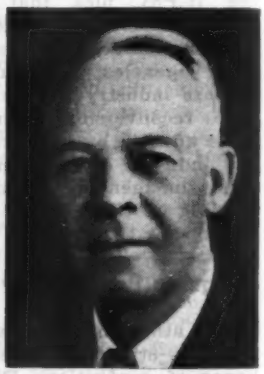
President

JOSEPH L. TRECKER
exec. v. pres., Kearney & Trecker Corp.

1st Vice President

W. P. KIRK
v. pres., Pratt & Whitney Division Niles-Bement Pond

2nd Vice President

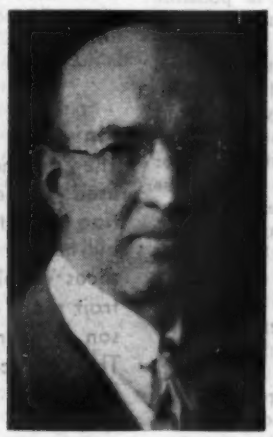


H. H. PEASE
pres., New Britain-Gridley Machine Co.

Treasurer

C. N. KIRKPATRICK
pres., Landis Machine Co.

Director



A. M. JOHNSON
pres., Barnes Drill Co.

Director

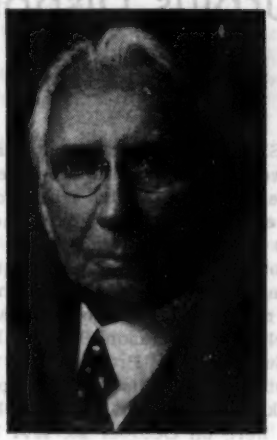
H. W. BOCKHOFF
pres., National Automatic Works Co.

Former Association Presidents Honored at Annual Meeting

A. H. TUECHTER
pres., Cincinnati Bickford Tool Co.

F. L. EBERHARDT
pres., Gould & Eberhardt

E. P. BULLARD, JR.
pres., The Bullard Co.



J. B. DOAN
chrmn., American Tool Works Co.

view, he pointed out the elevation of the standards of living all over the world in recent years and predicted a steady continuance of that trend. The very foundation of our own living standards are our efficient, high production machine tools. So he advised machine tool builders to send abroad men with the "know-how," to sell and apply and direct the operation of their equipment. Thus aiding other nations to improve their manufacturing methods. This course of action should secure the maximum foreign sales, insure satisfaction of foreign buyers, and build solidly, for future business.

In reporting for the Industry's Planning Committee, William P. Kirk, vice-president, Pratt & Whitney, urged the prompt adoption of surplus disposal policies as proposed by the association, with price schedules designed to move surpluses quickly while also recovering as much as possible for the government.

Tell Berna, general manager of the association, reported on activities of two committees. The Warehousing Committee is working closely with government agencies to provide adequate shelter for tools declared surplus, at the same time permitting prompt removal from shops to facilitate reconversion. The Electrical Committee has developed a composite of customers' specifications where these deviate from standard, which will be proposed as an aid to smooth and economical production of tools in post-war.

Several speakers touched on the difficult problems of contract termination and settlement. L. W. Scott Alter, president of The American Tool Works Co., described a plan being worked out in Cincinnati, to develop cost curves for each stage of progress in building machine tools. Termination officers, if such curves are approved after thorough checking, may then make immediate settlement of charges at cancellation of partially completed machines.

President Alter in his opening address, spoke at length on the difficult financial position of the machine tool builders if contract settlement is delayed. Funds already badly depleted by renegotiation might be so tied up that many builders would lack the working capital to proceed with urgently desired peacetime orders. He urged that every effort be made to speed determination of cancellation charges and that the builders use resourcefulness in keeping themselves liquid, to be prepared for the postwar demand for tools which he expects to surpass substantially pre-war volume.

The same problem of retaining sufficient liquid funds to develop and produce the necessary postwar tools was a main feature of a talk by A. G. Bryant, vice-president of Cleereman Machine Tool Co. He contrasted the position of the tool builders who, while filling war needs for a tremendous volume of machines, are thereby restricting their postwar demand, with that of the industries whose postwar markets are steadily growing into the greatest demand in history, and with other industries whose present profits are free from renegotiation and excessive taxation. He justified special consideration in renegotiation for the machine tool industry, if it is to have sufficient capital to operate in postwar.

The requirements of industry for reconversion equipment was the main theme of an address by B. D. Kunkle, vice-president, General Motors Corp. His company months ago surveyed their peacetime requirements. Many of their machines had been shipped to other producers of war goods, many completely altered, many even going abroad. General Motors expects to spend 500 million dollars in rehabilitation of its plants. Some government tools in their shops will be taken over, but a large number must be bought new. That re-equipment will require at least 20,000 machine tools.

The evening session on October 19th was highlighted by an inspiring talk by R. M. Gaylord, president of the National Association of Manufacturers and of The Ingersoll Milling Machine Co. He charged the machine tool builders, together with all of American industry, with the responsibility for maintaining in postwar, under any and all conditions, that same courage and initiative which has, through our free enterprise system, erected the highest standards of living the world has ever known.

At this session the entire membership stood in tribute to four of the association presidents of more than twenty years ago, who are still actively directing their companies. Silver bowls were presented to these men, F. L. Eberhardt, president, Gould & Eberhardt, E. P. Bullard, Jr., president, The Bullard Co., J. B. Doan, chairman, The American Tool Works Co., and A. H. Tuechter, president, The Cincinnati Bickford Tool Co.

In closing the meeting the incoming president, Joseph L. Trecker, painted the postwar picture as the fastest competitive race American industry has ever known. In that competition, success and perhaps even survival for American manufacturers will lie in the reduction of manufacturing costs and in rendering adequate service to their customers. "Manufacturers who sell products and merchandise to the public," said Mr. Trecker, "must get their prices down low enough to assure continued large scale buying. If the nation can be successful enough in making more goods continuously available for more people, then we can hope to maintain high-level employment. And because machine tools are a major factor in cutting costs and increasing productivity, the machine tool industry is the key to the postwar prosperity of the United States."

Surplus Disposal Arrangements Outlined at Panel Meeting

WASHINGTON — Despite an estimated 500,000 machine tools expected to be declared surplus from now until the end of the war, government officials feel that it is advisable for the nation to dispose of this equipment promptly, than to have it overhang the tool market for a period of years. This conclusion by Mason Britton, Director of Surplus War Property for the Reconstruction Finance Corporation, marked a highpoint in a panel discussion here on October 23, 1944 between government officials and representatives of five leading trade publications. Mr. Britton added that industry ought to throw out its old tools and get some of these government-owned surplus tools to achieve a "low-cost producing basis as soon as possible." He warned that prices would not be lowered on these surpluses and that sales were being made on a first-come, first-served basis.

Mr. Britton estimated that the War Department owns about 200,000 tools, DPC about 300,000, and the Navy and Maritime might have about 100,000. Of these, he believes that some 500,000 may be declared surplus. However, he pointed out that Army and Navy arsenals were replacing all tools older than five years, and had cleaned out some tools dating back to 1890. But up to a few weeks ago, the Army had only declared some 900 tools surplus, although surplus declarations since then have increased heavily.

Better to Sell Now

His deputy, Hans A. Klagsbrunn, reported that tool builders to whom he had spoken had generally felt that it is better to dispose of tools immediately than to hold them off the market. He stated that the RFC, disposal agency of surplus plants and equipment, had only about 1,000 surplus tools for sale at this time. It also has an "available list" of some 10,000 idle tools not yet released as surplus. When buyers indicate an interest in any of these "available" items, the RFC tries to have it declared surplus so that it may be sold. In addition, RFC may work up a list of tools to become available on VE-Day, so that sales of these items may be made for a specific future date. Meanwhile, it is selling government-owned equipment right along to the operators of this equipment, so long as they agree to keep it in war work as required.

Plant Clearance Efforts

Mr. Klagsbrunn revealed that the RFC has been holding discussions with plants operating government-owned equipment, in order to lay the basis for speedy plant clearance on VE-Day. All except 27 of the 1,000 plants in this category had been visited by RFC representatives to discuss plant clearance problems. A recent RFC questionnaire was reported as indicating that 50 to 60 percent of equipment operators were interested in purchasing government-owned items. Mr. Klagsbrunn further outlined the planned establishment of storage and disposal centers in major industrial areas to speed plant clearance, permit inspection of tools for sale, and take adequate care of special equipment. He reported that sales were being made to dealers at established ceilings.

In response to a question, Mr. Britton pointed out that the auto industry would like to be assured of the availability of certain key tools in their plants on VE-Day, so that they may be able to determine whether or not they should place orders for new equipment of this type. But he pointed out that some of these tools may be required after VE-Day on war work, and even if auto makers placed orders for new machines, it was possible that even those machines might later be enlisted on war work.

Auto Makers Tool Problems

Mr. John S. Chafee, Director of WPB's Tools Division, stated that the amending of Order E-1-b would enable the auto industry to secure firm delivery dates on tentative orders. He added that if tool builders could turn out more tools, more would be available for the auto makers. However, it was pointed out that VE-Day cancellations would aid the industry on its deliveries. Inability to increase output was laid to manpower shortages and the fact that much of the tool industry's capacity is directly engaged in war work. Mr. Chafee estimated that 1944 shipments would come to about $480,000,000.

Surplus Plants Discussed

On the subject of surplus plants, Mr. Britton said that they would fall into three categories: (1) those which would be kept in operation; (2) stand-by plants; and (3) war reserve plants. Stand-by plants will be plants retained as such during the war only, but will be sold after the war. War reserve plants are those which the Army and Navy plan to keep after the war. These reserve plants may be sold if the sale involves no basic change in the plant so that it can be turned to war production in from 60 to 120 days' notice. All officials present agreed that the Surplus Property Bill setting up preferences for various groups might seriously delay surplus disposal and cause wide unemployment.

Aside from the government officials, those attending the panel discussion included its chairman, Paul Wooton, President, National Conference of Business Paper Editors, John Haydock, Managing Editor, American Machinist, Guy Hubbard, Machine Tool Editor of Steel, E. C. Kreutzberg, Editor of Steel, Erik Oberg, Editor of Machinery, and Frank J. Oliver, Technical Editor of The Iron Age.

RESEARCH INSTITUTE PLANNED FOR WEST COAST INDUSTRY

LOS ANGELES—Formation of a non-profit research institute for the benefit of western manufacturers is proposed by Lawrence A. Harvey, Harvey Machine Works, Los Angeles, who is Chairman of the Industrial Research Committee, part of the California Commission on Interstate Cooperation, whose membership includes prominent state officials, business men and educators.

The proposed research institute would handle, on a fee basis, the research and testing problems of western manufacturers, so that these smaller and newer industrial enterprises might enjoy the assistance of skilled personnel, and the use of technical equipment, at a cost that they could afford. Facilities and services comparable to those of the well-known Battelle, Armour and Mellon institutions are contemplated, according to the booklet prepared by the sponsors of the plan.

TOOL BUILDERS WELCOME E-1-b AMENDMENT

CLEVELAND—Machine tool builders expressed gratification over the War Production Board's amendments to PR 24 and GPO E-1-b, authorizing placing of unrated purchase orders without WPB approval. These amendments eliminating ratings from non-military orders and setting aside 25 percent of the toolbuilders' capacity for this business are regarded as removing many uncertainties which have hindered the placing of reconversion tool orders.

Builders assert that few additional ratings for non-military orders enables them to give definite delivery dates on a first-come, first-served basis. That assurance will also facilitate agreement on price, which was difficult when tentative delivery dates were projected many months into the future.

Wartime Washington

More WPB Tangles

The easy assumption of many people that the wide differences of opinion over reconversion by many Washington policy-makers have been skillfully blended into one tentative plan for VE-Day, can now be checked off as either wishful thinking or hopeful prayer. The fact is that there is currently one of the bitterest controversies raging in WPB and even other agencies are adding fuel to the fire.

It now appears that some WPB executives believe that some ratings should be assigned to various industries, while Krug and his followers want to eliminate all ratings except for military and critical items. To further compound the confusion, it is reported that William Batt of the Combined Resources and Planning Board would like to see that lendlease and other exports enjoy some priorities, while Maury Maverick of Smaller War Plants Corporation would like to have priorities for small businesses. Moreover, Chester Bowles of OPA opposes the fundamental theory of lifting controls, because he fears that price ceilings will crack under reconversion buying pressure. As a concession to Bowles, it has been announced that controls over leather and textiles would be retained for "the public interest."

Since WPB Chairman Krug sponsors the earliest possible lifting of controls, only his strong backing by the White House will prevent the pressure of other plans from upsetting the tentative WPB program. Some WPB officials declare that within 24 hours after the defeat of Germany the differences within WPB could be ironed out with the aid of a lot of "battling."

The WPB Statistical Division complicated the situation by trying to project the probable demand for steel during the two consecutive 90-day periods after the end of the war. This analysis indicated such heavy demand after the first 90-day period that the implication of the report pointed to the necessity of assigning ratings to non-military users of steel after the war. Some observers hold that the argument is weak on the grounds that the steel industry could easily forestall any bottlenecks in particular items by continuing at peak production right after the war to stock up warehouses and provide working inventories to as many firms as are ready to accept them.

Plant Sales Disturbing

The Reconstruction Finance Corporation ran into a bit of unexpected difficulty in its plans to get off to an early start on marketing government-owned plants. RFC announced that certain plants were available for sale, although it tried to emphasize that sales were conditional on the future release of these plants from war production. Unfortunately, some employees at such plants assumed that the offer of such property for sale meant the early end of its use in war work and they started looking for other jobs. As a result, Secretary of Commerce Jesse H. Jones had to make a public statement to the effect that these sales did not mean that the plants involved would soon end war production.

Reconversion Labor Hoarding?

Government officials fear that industry is now hoarding labor for reconversion use, in the same way that labor was hoarded early in the war by plants converting to war production. This factor is considered one explanation why cut-backs fail to release on the labor market the number of employees originally expected to be involved. It is pointed out that plants working on a cost-plus-fixed-fee basis could easily do this at no cost to them.

Government sources report that there are only 74,000 persons on unemployment compensation rolls throughout the country. Since this is some indicator of available employables, the seriousness of the labor shortage can be appreciated, despite the report that total unemployment in the nation comes to 1,000,000 persons. Many of those out of work are unemployable, or else they would be on unemployment compensation rolls, despite the fact that employable workers changing jobs are easily able to find new ones quickly before being eligible for unemployment compensation. Thus, the WMC's difficulty in finding 200,000 workers with special skills in certain areas can be appreciated.

"Spots" May Be Revised

WPB may revise its "spot authorization" set-up to give blanket permission to plants on the West Coast with less than 50 workers, and plants in other areas with less than 100 workers, to enter civilian production without having to meet present requirements on manpower and material. Two reasons being advanced for this plan are: (1) that small plants are being hard hit by cutbacks in subcontract work and cannot easily find similar war work and (2) there is plenty of material to cover the needs of such small plants. As it is, the bulk of authorizations through the 24th of October involved plants with less than 100 employees.

Henry Kaiser's "reconversion plan" presented to the President is regarded as having many political implications here. Kaiser's plan is that he and certain other manufacturers would be charged to operate government-owned plants after VE-Day, and that remaining war orders would be concentrated into these plants as far as possible, thus allowing other privately-owned plants to proceed with reconversion. The only trouble with this idea is that political favoritism in selecting the operators of these plants would be possible, since such assignments involve fixed fee arrangements at no risk to the plant operators.

The foreign trade situation for postwar is very confused due to the different schools of thought within the government. The State Department, the Foreign Economic Administration, and the Department of Justice hold different ideas on the subject. Industry observers believe that the action taken by other foreign nations will determine our trade policies.

Tank Toter—A light tank backs into a British Hamilcar glider, designed especially to carry this support armor for airborne troops. The glider can also carry troops, guns, assault craft and vehicles of all kinds

Spotting the Air News

Atomic Power Research

Government agencies and industrial organizations are spending very large sums of money researching for "atomic power" which would so increase the range of aircraft that the present concept of air war and air commerce would be entirely changed. For short range operations it would reduce the fuel load, giving designers new leeway for accommodations and for structural weight. The initial step toward hoped-for harnessing of atomic energy takes the form of super-concentrated fuels. These could be used in jet-turbine engines as well as in reciprocating engines.

Military gliders, which narrowly missed being thrown out of the air forces program two or three years ago, are now doing important work in airborne operations, and again the question arises whether powerless flight will be practical in commercial air cargo services. While the motorless airplanes are doing a fine job carrying troops, bulldozers, tanks, cannon, and supplies, the cost is not counted. On the airlines, it is true that a fully loaded airplane can tow gliders with additional load. But the speed is reduced. Against the disadvantages of lower speed and additional costs, will be the advantages of dropping and picking up glider train units while the train continues in flight, and of the glider's ability to operate out of restricted landing areas. Most engineers predict failure for the commercial glider, but it will have the benefit of unexpected army experience.

Metal vs. Wood

Important to the metal working industry, if aircraft production becomes a big industry, is the ultimate choice between metal and wood. Most of the wooden airplanes designed in the early war aluminum shortage have been abandoned or taken out of production. Of course some of them would have been discontinued anyway, even if built of metal, because they were trainers.

Fairchild's new army cargo plane, designed in wood, has been changed to metal. The Kaiser-Hughes Behemoth, building on the west coast, will be completed in wood, but later versions, if any, will be metal.

Most noteworthy wooden airplane in operation is the highly capable British de Havilland mosquito, whose producers expect to offer a postwar commercial version.

In sizing up wood-metal trends, one should bear in mind that the air forces command does not like wood, and has pushed the trend away from it. Airplane wood, today, means plastic-bonded wood, it is as strong as metal, fire-resistant, corrosion-resistant, and in some cases cheaper than metal. Weight is about the same. Modern heat molding to forms, and heat setting of the bond, will enable the wood school to give a good account of itself. Majority of engineers predict metal will dominate the field, and will be adopted for many light personal planes, now made mostly of steel tube and fabric.

Rockets Aid Air Power

Rockets are among the world's oldest fire weapons. You hear of the rocket's red glare in the Star Spangled Banner. They now assume a major position in modern war as the army puts $150,000,000 into production expansion. The Navy is ordering rockets at a rate of $100,000,000 per month. First big publicity on rockets resulted from announcement of the bazooka. The rocket is a shell that explodes on contact or time fuse, same as if shot from a cannon, except that it has jet propulsion on its tail—same as your fourth of July fireworks. Big advantage is that it is aimed and launched by a light stovepipe-like device, only a fraction as heavy as a cannon necessary to fire equivalent demolition power. This enables airplanes to carry the equivalent of heavy artillery for attacking ships and ground objectives. Rockets are more accurate in aim than either low-level or high-level bombing, but they are far less accurate than artillery. Progress is being made toward improved accuracy of aerial rockets.

Crystal Lapping — Quartz crystals are milled at the Dobbs Ferry plant of North American Philips Company. Lapping plates must be reground, then recut with crisscross slots at periodic intervals. With proper abrasive mixtures, the plates perform the delicate lapping process that brings quartz crystals down to desired frequency for communication equipment

Canadian Aircraft Workers Ask Government Aid for Industry

OTTAWA—Canada's 120,000 aircraft workers are petitioning the federal government to take measures for survival of the industry after the war to supply domestic requirement in aircraft and to engage in the export trade. About a year ago the government set up a committee headed by Director General Ralph Bell of aircraft production and including representatives of government departments and of the industry to advise on ways and means of keeping a residue of the industry going after war contracts terminated. This committee recommended government assistance in the form of orders for designs and test models of postwar planes, to be followed by orders for defense and other types of craft. Munitions and Supply Minister Howe adopted only part of the report. He takes the attitude that the Canadian industry is not well adapted to engaging in the designing of planes and declines to sponsor government assistance in this department.

Howe's attitude is that Canada can have a fair-sized peacetime aircraft industry by taking advantage of its access to the designing and engineering accomplishments of both the United States and Great Britain. He has put this idea into practice by obtaining Canadian rights to the use of working plans for a U. S. transport plane, the Douglas DC-4, and having

them altered to accommodate the British Rolls-Royce engine in place of the American engine. A contract for 50 of the transports for Trans-Canada Air Lines over which Howe has governmental jurisdiction will be carried out by Canadian Vickers in a government-owned plant in Montreal.

Cuts in Plane Program

War contracts of some Canadian aircraft companies have already been cut back. A U. S. government contract for Curtiss Hell Divers with Fairchild Aircraft Limited, Montreal, has been reduced from 500 to 300 planes. Noorduyn Aviation Limited, also of Montreal, has had contracts for Norseman transports and advanced trainers cut. Slack in the Noorduyn plant may be taken up by sub-contracts from de-Havilland Aircraft and Victory Aircraft for Mosquito and Lancaster bombers.

Some aircraft plants are scouting for new work suitable to them for the time between the reduction or termination of war contracts and the clarification of their postwar position. Highway buses and metal furniture are among items in contemplation. Canada Car and Foundry Company will be able to rapidly revert to manufacture of railway equipment which was its principal prewar business.

To Scrap Surplus Plants

Government-owned war plants will be turned over to private enterprise where there are suitable buyers for them when their war production ends. Where there are no buyers they will be scrapped. The only exception is likely to be the big synthetic rubber plant at Sarnia, Ontario, which will be operated under government control to serve commercial rubber companies. Munitions Minister C. D. Howe gave notice of Ottawa policy a few days ago when he presided at a celebration of the first anniversary of the opening of the rubber plant.

War Assets Corporation, government agency for the disposal of surplus war goods, is keeping close watch on its sales of machinery and other goods to prevent their being bought for the purpose of attempted bootlegging into the United States. Ottawa and Washington have an understanding that dumping of surplus war supplies across the border either way will not be permitted.

Machine Tools Plentiful

Materials in which supply is becoming easier include aluminum, nickel, lead, magnesium, ferro-manganese, molybdenum, other alloy metals, pig iron, tool steel. Restriction on the use of some of these will be eased in advance of the removal of parent war controls at the end of the German war. Machine tools also are plentiful. Malleable iron castings and sheet steel are still in short supply and demand for copper tubing greatly exceeds quantities available.

Names in the News

Allison L. Bayles

Allison L. Bayles, formerly director of research and development of the Rogers Diesel and Aircraft Corp. and its predecessor, the Hill Diesel Engine Co., of Lansing, Mich., has been elected vice president of the American Engineering Co., Philadelphia, Pa. Mr. Bayles has been active in the construction, industrial, export and investment fields.

George Green has been appointed vice president in charge of sales of the Mt. Vernon Car Manufacturing Co., Mt. Vernon, Ill., a division of H. K. Porter Co., Inc., Pittsburgh, Pa. Mr. Green was previously railway sales manager of Elastic Stop Nut Co. and later assistant vice president in charge of railroad sales of the Union Asbestos & Rubber Co., Chicago, Ill.

K. Swanson, formerly chief engineer of the Federal Machine & Welder Co., has joined the Progressive Welder Co., Detroit, Mich., as chief engineer with that firm. **John D. Gordon,** former executive assistant to the president of the Federal Machine & Welder Co., has also joined the Progressive Welder Co. as general sales manager.

John S. Hutchins, vice president in charge of sales of the Ramapo Ajax Div., American Brake Shoe Co., New York since January 1, has been appointed executive vice president.

Donald Teetor, recently named general sales manager, Perfect Circle Co., Hagerstown, Ind., has been elected vice president in charge of sales.

A. D. R. Fraser, former secretary of the Rome Cable Corp., Rome, N. Y., has been elected president of the firm to succeed **H. T. Dyett,** who has been named chairman of the board.

Walter Sormane, formerly sales manager of the heating division, Schwitzer-Cummins Co., Indianapolis, Ind., has been named general sales manager of the Conco Engineering Works, Mendota, Ill.

W. P. Michell

S. L. Eastman

William P. Michell, who has been with the Mack Truck, Inc. organization since 1923, has been appointed assistant chief engineer. Mr. Michell has recently returned from Great Britain where he has been serving in an advisory capacity on military truck transport at the invitation of the British government.

S. L. Eastman has been appointed chief engineer of the Cleveland Worm & Gear Co., Cleveland, Ohio, where he has been a member of the firm since 1927, serving in various sales and engineering capacities.

George Mast has been appointed engineering and production supervisor for the Milwaukee Metal Spinning Co., Milwaukee, Wis. Mr. Mast has been with the Creamery Package Mfg. Co., Fort Atkinson, Wis., and Chicago, Ill., for the past 16 years.

Charles E. Slaughter has been appointed sales manager of the Thomas

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Ottawa expects imports of many small metal products from Britain to be resumed early next year if London carries out its reported intention of reducing British acceptance of lend-lease supplies from the U. S. to bare essentials in order to be in a position to modify its pledge not to export goods made from materials obtained under lend-lease or similar materials produced at home. Under this pledge Britain has refrained from supplying Canada with many lines of metal products which formerly supplied the Canadian trade almost exclusively.

Foreign Trade Prospects

Canadian officials who have investigated the economic resources of China in connection with possibilities of postwar trade have reported that while the prospect of China being able to repay credit advances for postwar buying through development of Chinese export trade is not bright, Canadian manufacturing firms with sufficient capital might have a good chance of protecting their export accounts by establishing branches in China. Ottawa is planning to set up a special agency to have charge of business with China.

Canada's mutual aid administration, which buys for UNRRA, is in the market for hydro equipment, pumping plants, diesel engines and other heavy machinery.

Machine Mfg. Co., Pittsburgh, Pa. He formerly was general sales manager of Liberty Planers, Inc., Hamilton, Ohio.

Albert Hanson has been named vice president in charge of engineering for Drayer & Hanson, Inc., Los Angeles, Calif., while **J. C. Lombardi**, who has been in a special sales capacity for a number of years, has been appointed vice president and director of sales.

William R. Teller has been appointed director of research and development of the Bryant Heater Co., Cleveland, Ohio. Mr. Teller has been assistant director of the testing laboratories of the American Gas Association, Cleveland, where he has served in various capacities since 1930.

Charles F. Mullen has been named general superintendent of Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., in charge of all firearms manufacturing activities. Mr. Mullen was formerly with the Republic Aviation Corp., associated with the production of P-47 Thunderbolt fighter planes and, more recently, he was design and manufacturing consultant in the development of projects for Colgate's Long Island Company.

H. Curtis Hardick, formerly field representative of the Republic Aviation Corp., Farmingdale, L. I., assigned to subcontractors associated with the manufacture of the Thunderbolt P-47 fighter, has been named general manager of D. A. Comstock & Co., South Norwalk, Conn.

Felix N. Williams, general manager of Monsanto Chemical Company's plastic division at Springfield, Mass. has been elected vice president of the company. Mr. Williams was formerly associated with the Swann Chemical Co., Anniston, Ala., before it was acquired by Monsanto. He later transferred to the Tennessee plant where he stayed until 1941 when he became production manager of the phosphate division of the firm.

BUSINESS ITEMS

Chicago-Latrobe Twist Drill Works has opened a branch warehouse and sales office at 2043 Santa Fe Ave., Los Angeles 21, Calif. This office is under the supervision of the district sales representative, J. C. Malugen.

Rudel Machinery Co., Inc., Boston, Mass. has been appointed sales representative for the **Logansport Machine Co.**, Logansport, Ind. in the New England territory, with headquarters in Boston.

L. H. Gilmer Co. of Philadelphia, Pa., manufacturers of industrial V-belts, has been purchased by the United States Rubber Co. No change in operations or management is planned.

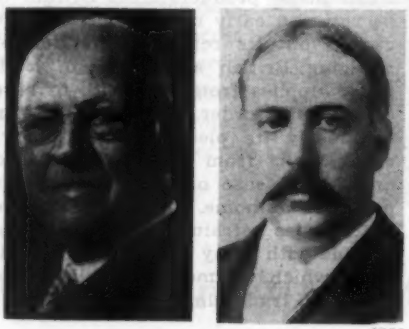
The Vernon Line of machine tools of the **Machinery Manufacturing Co.** of Los Angeles, Calif. has been acquired by **The Sheldon Machine Co., Inc.**, Chicago, Ill. Manufacture of these machine tools has been transferred to the Sheldon plant in Chicago.

Russell S. Mann and **Bennett A. Williams** have formed the **Grinding Supply Co.** with offices in the Chicago Daily News Bldg., Chicago 44, Ill. to handle supplies for the grinder. Mr. Mann will be available for engineering advice and assistance in grinding problems.

Cyclograph Services, Ltd., 12 Jordan St., Toronto, Ont. will succeed **Burlec, Ltd.** as the Canadian distributor for the **Allen B. DuMont Laboratories, Inc.**, Passaic, N. J. The Canadian organization will serve as a sales and field engineering organization and also maintain and repair DuMont equipment in the Dominion.

Barnes and Reinecke, industrial designers and engineers, and **Barnes, Reinecke and Rebholz**, associate company, have completed their removal to larger quarters at 230 East Ohio St., Chicago 11, Ill.

OBITUARIES



1900

William Bausch C. C. Worthington

William Bausch, 83, died at his summer home near Rochester, N. Y. Oct. 19. Mr. Bausch, chairman of the board of the Bausch & Lomb Optical Co., with which he had been associated for the past 69 years, was the last surviving son of the founder of the company. He was active in all phases of the firm's business, especially experimental work which resulted in his contribution of numerous patents and inventions.

Charles C. Worthington, 90, former president of the Henry H. Worthington Pump Manufacturing Co. (now the Worthington Pump & Machinery Corp.), the International Steam Pump Co., the Holley Steam Pump Co. and the Worthington Automobile Co., died October 21. Mr. Worthington also, at one time, operated pump plants in England, Austria, Germany and France, which were the result of his improvements and developments in pumps, compressors and other machines.

Edgar Highley, 63, superintendent of wire mills of the Allegheny-Ludlum Steel Corp., Dunkirk, N. Y., died Oct. 16.

MEETINGS

American Machine Tool Distributors' Association. Fall Meeting. The Homestead. Hot Springs, Va. Nov. 13-14. Thomas A. Fernley, Jr., Executive Secretary. 505 Arch Street, Philadelphia 6, Pa.

American Society of Mechanical Engineers. Annual Meeting. Pennsylvania Hotel. New York, N. Y. Nov. 27-Dec. 1. Ernest Hartford, Executive Assistant Secretary, 29 West 39 St., New York, N. Y.

International Business Conference. Claridge Hotel. Atlantic City, N. J. Nov. 10-18. Conference Headquarters, Room 716, 10 Rockefeller Plaza, New York 20, N. Y.

National Association of Manufacturers. Reconversion Congress of American Industry. Waldorf-Astoria Hotel. New York, N. Y. Dec. 6-8. Robert M. Gaylord, President, 14 West 49 St., New York 20, N. Y.

National Exposition of Power and Mechanical Engineering. Madison Square Garden, New York, N. Y. Nov. 27-Dec. 2. Charles F. Roth, Manager, 480 Lexington Ave., New York 17, N. Y.

Society of Automotive Engineers. Annual Meeting. Book-Cadillac Hotel, Detroit, Mich. John A. C. Warner, Secretary & General Manager, 29 West 39 St., New York, N. Y.

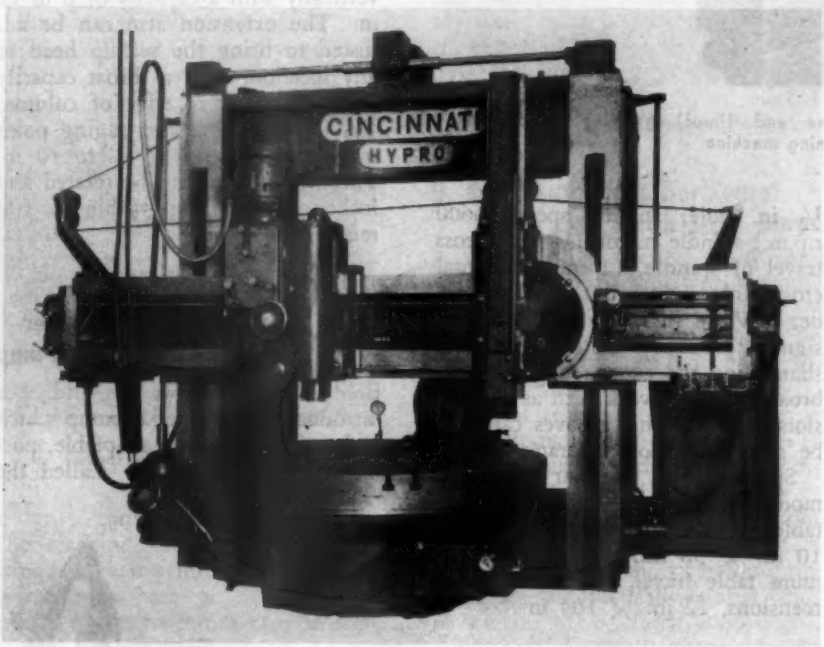
Society of Automotive Engineers. National Air Cargo Meeting. Hotel Knickerbocker, Chicago, Ill. Dec. 4-6. John A. C. Warner, Secretary & General Manager, 29 West 39 St., New York, N. Y.

Society of Automotive Engineers. National Fuels & Lubricants Meeting. Hotel Mayo, Tulsa, Okla. Nov. 9-10. John A. C. Warner, Secretary & General Manager, 29 West 39 St., New York, N. Y.

Society of the Plastic Industry. Fall Meeting. Waldorf-Astoria Hotel. New York, N. Y. Nov. 13-14. Albert Pfaltz, Public Relations Dept., 295 Madison Ave., New York, N. Y.

Shop Equipment News

Cincinnati Planer Company Combination Boring And Milling Machine Saves Set-Ups and Time



Cincinnati combination boring and milling machine

A combination boring and milling machine, designed and built for special production jobs on which there is a certain amount of boring and turning and on which in the same set up pads or slots are milled, has been announced by Cincinnati Planer Co., Cincinnati 9, Ohio. It is said to save complicated set ups and time.

The bed is of one-piece construction and heavily ribbed. The transmission is fully anti-friction and all gears are hardened. Flat table tracks are bolted to the bed and the table is centralized and given radial support by a large anti-friction bearing mounted in the center of the table.

There are 16 speeds in geometric progression to the table ranging from 1 to 30 r.p.m. A low horsepower motor drives through a worm drive box, providing milling feeds from 2 in. per min. to 80 in. per min. The same transmission is utilized in both table drives.

Filtered lubrication between bed and table tracks is provided by an individual motor driven pump. A pressure switch stops the main motor automatically, in case of lubricant pump motor failure.

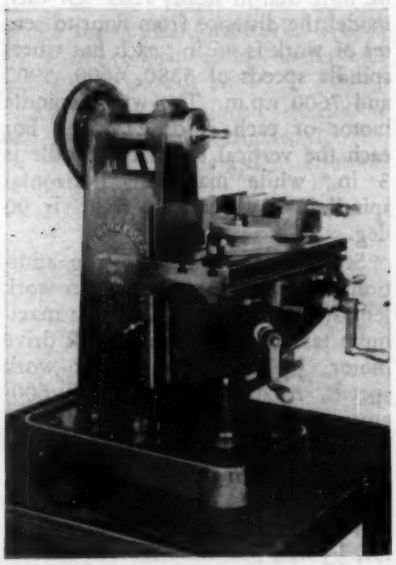
Feed on the boring head ranges from 1/96 to 0.8 in. in 12 mechanical gear changes in geometric progression. An individual feed and traverse box is provided for each head.

Improved Vertical, Horizontal Milling Machine Announced

A new and improved bench milling machine for vertical or horizontal milling is anounced by Benchmaster Manufacturing Co., 2952 West Pico Blvd., Los Angeles 6, Calif. It is said to be speedily and easily convertible from vertical to a conventional horizontal machine with overarm and arbor by simply interchanging the spindle attachments. In either position the Benchmaster mill is equally adapted to precision tool work, or high speed production by equipping it with a rack and pinion feed in place of the hand feed.

The improved mill is described as more streamlined, heavier and more accurate than previous models and, though very low priced, having a versatility and ease of operation heretofore confined to larger and more costly machines. Further improvements outlined are the ball thrust bearings on the vertical lead screw; giblocks on table; saddle and knee for insuring accuracy once the machine is set up; and an equalized weight distribution that provides rigidity enough to do heavy work accurately yet allows for great ease in handling.

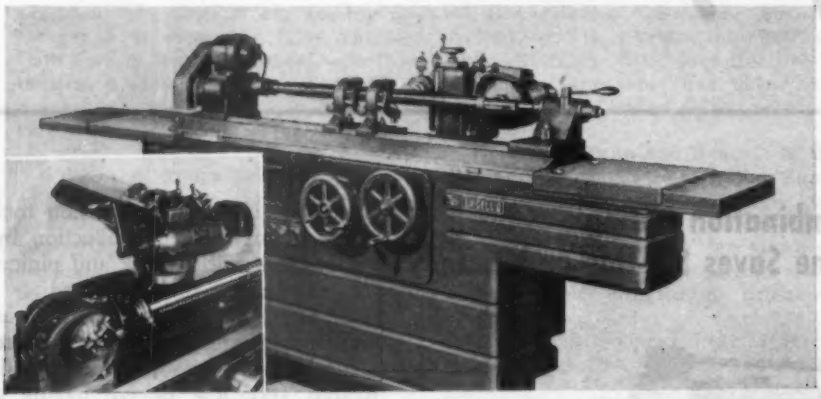
Standard table size is 6×14 in.; optional, at extra cost, 6×18 in. Longitudinal travel is 8½ in. on standard table, 12½ in. on special



Benchmaster bench milling machine

table. Traverse travel is 5½ in. Vertical travel is 8½ in. on the vertical mill and 9½ in. on horizontal mill. Hand feed is standard equipment, while rack and pinion feed are optional at extra cost. Arbor is optionally ⅞ in. or 1 in. dia. The mill is V-belt driven by a 1/3 hp. motor.

Ex-Cell-O Introduces Four Broach Sharpening Machines for Handling Round or Flat Broaches



Ex-Cell-O round broach sharpening machine and (inset) grinding spindle of flat broach sharpening machine

Four broach sharpening machines have been announced by Ex-Cell-O Corporation, 1224 Oakman Blvd., Detroit, Mich.; a large and a small one, each, for flat and round broach sharpening.

Styles 80 and 80-L are described as economically sharpening the cutting edges of round broaches of 9¾ in. max. dia. or of grinding circular slots and grooves on other work to close tolerances. Each handles work of 4½ in. max. dia. and 9/16 in. min. dia. in steady rests. Of each model the distance from floor to center of work is 46 in.; each has wheel spindle speeds of 3580, 4600, 5900 and 7600 r.p.m. The wheel spindle motor of each is of 1½ hp. For each the vertical travel of spindle is 3 in., while maximum horizontal spindle swivel, left or right, is 90 deg.

Style 80 has the following additional specifications: maximum work length between centers, 53 in.; maximum table travel, 54 in.; work drive motor, ¼ hp., 1200 r.p.m.; work speeds, r.p.m., 200, 400 and 600; cross travel of spindle, 8 in.

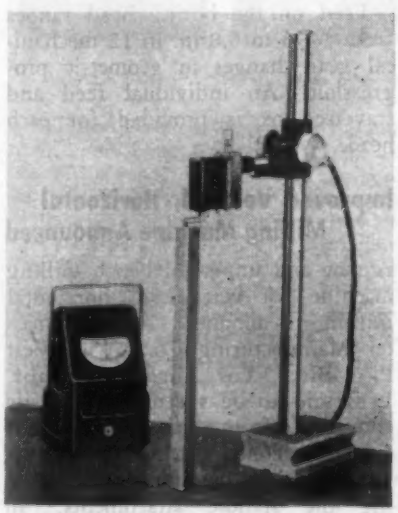
Similar specifications are peculiar to style 80-L: maximum work length between centers, 84 in.; maximum table travel, 80 in.; work drive motor, ½ hp., 900 r.p.m.; work speeds, r.p.m., 125, 220 and 350; cross travel of spindle 10 in.

Styles 81 and 81-L have the following specifications in common: distance from ½ in. wide wheel to table, with spindle vertical, maximum 12⅜ in., minimum 2¼ in.; distance from floor to top of table, 40¼ in.; bolt size for central tee slot in table, ⅝ in.; grinding wheel size, 6 in. dia. × ½ in. thick × ½ in. hole; spindle speed, 3600 r.p.m.; spindle motor 1½ hp.; cross travel of spindle, 11 in.; horizontal cross slide swivel left or right, 90 deg. While these machines are designed primarily for economically sharpening the cutting edges of flat broaches, other work such as straight slots, keyways and grooves can also be ground to close tolerances.

Specifications peculiar to each model include: style 81, maximum table travel, 40 in.; table dimensions, 10 in. × 58 in.; style 81-L, maximum table travel, 80 in.; table dimensions, 12 in. × 104 in.

Sheffield Precision Height Indicator with Electrigage

A new type precision height indicator with Electrigage that gives a quick, positive and accurate reading is announced by the Sheffield Corporation, Dayton, Ohio. It is designed for use on a surface plate.



Sheffield precision height indicator

The instrument includes a surface plate block, a 26 in. column with rack and a Sheffield Electrigage, 1,000-1 amplification, smallest graduation 0.0001 in., with electric pickup head mounted on an adjustable extension arm. A micrometer is provided for 3/32 vertical adjustment of pickup head, allowing the operator a much wider range of rough comparison measurement than possible with the Electrigage alone.

The mounting bracket is adjustable vertically with a capacity of 0 to 18 in. The extension arm can be adjusted to bring the pickup head to any location, with a throat capacity —gaging point to edge of column, 4½ in. to 11 in., and gaging point to edge of base, 3½ in. to 10 in. The pickup head can be rotated and locked in position within a full range of 360 deg.

Brady Announces Pinch Hitter Portable Centrifugal Pump

Brady Pump Co., Muncie, Ind., has introduced a centrifugal pump which it describes as highly adaptable, portable and self-priming. Called the Pinch-Hitter, it may be carried in one hand and quickly attached wherever needed. Flexible hose eliminates the need for extra piping.

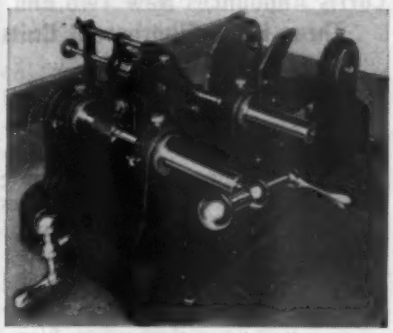
Brady Pinch-Hitter portable pump

The pump has a 110 v., heavy duty, ball bearing motor. Its construction is said to provide for handling abrasives or steel chips. It can also be used for cleaning sump tanks and for liquid transfer. Its g.p.h. capacity is: water soluble, 1,200; light oil, 1,000; heavy oil, 600. Delivery may be adjusted downward to a drop per minute by regulating discharge nozzles.

Fulmer Announces Rod Borer And Hydraulic Ring Lapper

The Fulmer Piston Ring Lapper, now available for civilian use from the C. Allen Fulmer Co., 1217 First National Bank Bldg., Cincinnati, Ohio, is described as simplifying aircraft engine overhaul. It is said to eliminate guesswork in fitting piston rings, reduce "break-in" time from hours to minutes and save tearing down engines because rings do not seal properly. It will handle cylinders of all diameters encountered in aircraft engine servicing.

From 10 to 25 strokes of the machine are all that is normally required



Fulmer aircraft rod borer

to lap a conventional set of rings. The machine will lap full sets of rings into their cylinder barrels up to a maximum bore of 6⅜ in. On special order, machines can be supplied to handle greater bores.

Another civilian-available product announced by the Fulmer Company is its aircraft rod borer, said to give factory accuracy and finish on connecting or articulating rods. No hand scrapping or fitting is required. The bored holes are round, straight, of morror-like smoothness, parallel and in the same plane so that the rods are ready for assembly.

The machine has been designed to be simple in operation, easy to set up for any size rod in common use and flexible, so that boring of crank pins, piston pins or knuckle pins can be handled. In addition to boring operations, facing, chamfering or radiusing of the bearings can also be done to extreme limits of accuracy. Six adjustable boring feeds are available from 0.0015 in. to 0.009 in. per revolution of the boring bar. The bars can be power operated through the use of a ½ in. electric drill, or they can be rotated by hand.

D. & H. Automatic Horizontal Rough and Finish Shell Borer

A single end horizontal rotary continuous boring machine with stations, for the boring and facing of 155 mm. shells, has been developed by Davis and Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis. A special feature of this machine is the automatically operated collet chucks, assuring perfect hole concentricity to the outside diameter.

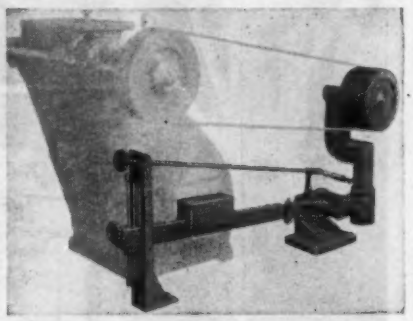
Shells are manually loaded from a conveyor. Locating for length is automatic and the chucks holding the parts are automatically closed and, by means of a clutch mechanism, rotation of chucks is started.

After the cycle of the machine is started, operations are automatic until the shell is ejected on to a conveyor. A cycle takes 84 seconds.

Lathes Converted by Divine Abrasive Belt Backstand

Divine Brothers, Dept. EJL, Utica 1, N. Y., has developed an abrasive belt backstand, employing front tracking tension controls, with which almost any lathe can be converted for abrasive belt work, grinding or polishing.

The backstand has front controls for adjusting belt tension and track-

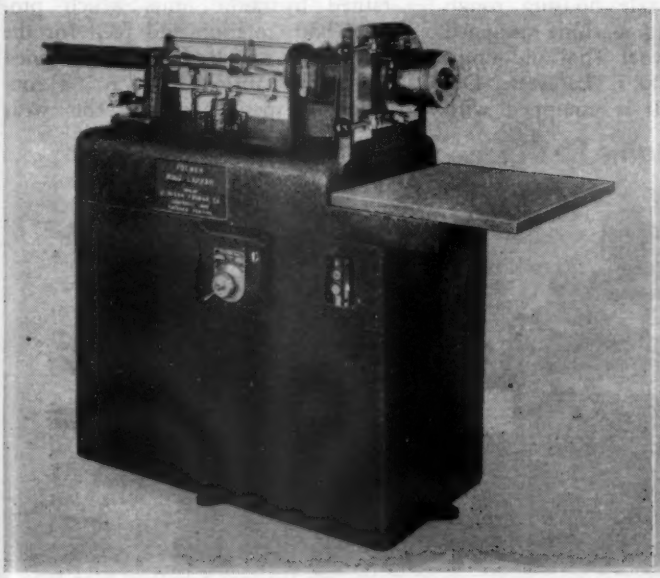


Divine abrasive belt backstand

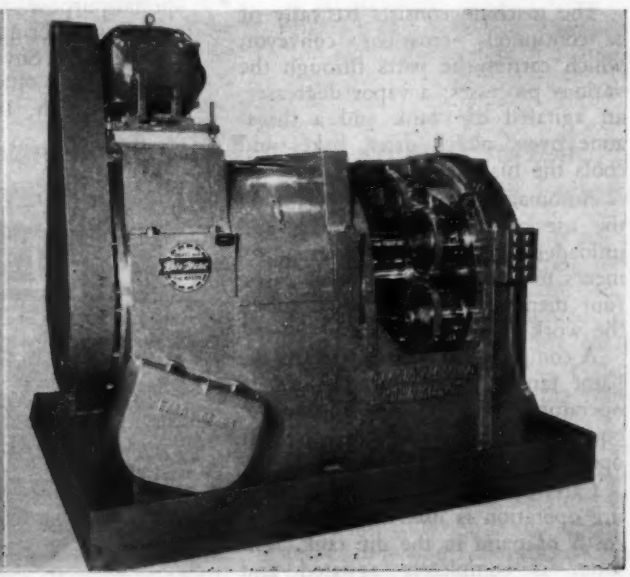
ing alignment which can be quickly reached by the operator. Tension is attained by positive counter-weighing; there are no springs. Belts are quickly changed by releasing friction lock and raising counterweight arm.

Either right or left hand models are furnished. Sheet steel hoods for inclosing the backstand are available, as are hoods with built-in platen for flat sanding work. Several types of contact rolls, hoods and lathes are also offered.

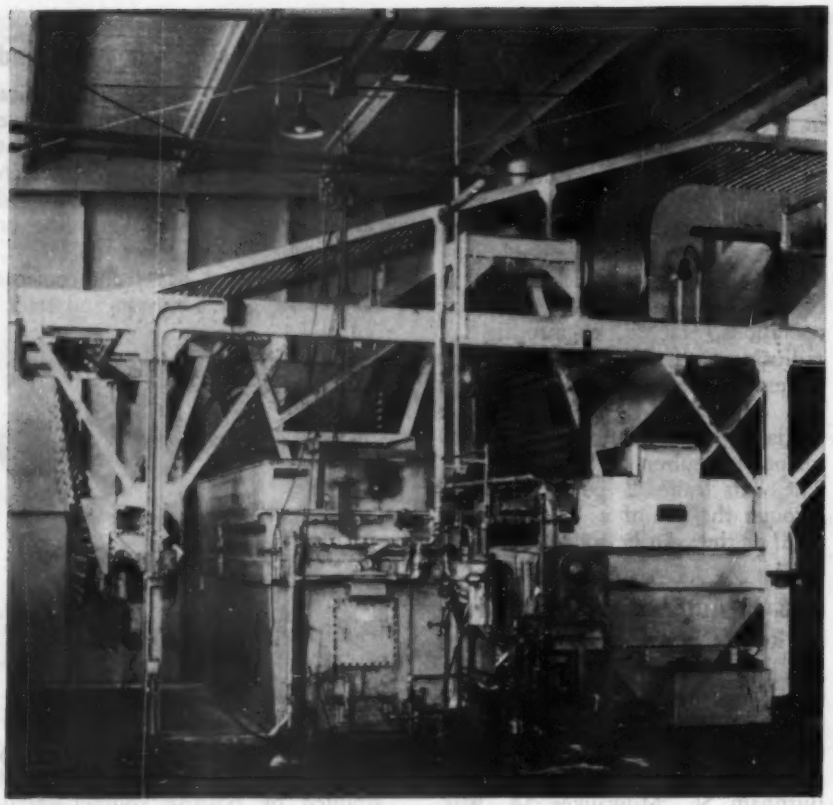
As to specifications: maximum belt width, 6 in.; standard length, 14 ft. 10 in.; floor space required, 14 in. × 71 in.



Fulmer hydraulic piston ring lapper



D. & H. Automatic Shell Borer



Industrial Oven automatic finishing system

Industrial Oven Automatic Finishing System Speeds Output

The Industrial Oven Engineering Co., 11621 Detroit Ave., Cleveland, Ohio, has developed a new automatic finishing system for painting the steel landing mat sections used in building emergency airfields. This machine is said to be immediately adaptable, without construction change, for a variety of peacetime work.

The machine consists basically of a continuous cross-bar conveyor, which carries the parts through the various processes; a vapor degreaser; an agitated dip tank and a three-zone oven, which dries, bakes and cools the mats continuously.

Automatic operation, including the use of mechanical loaders and unloaders, cuts manpower requirements to a minimum; in some cases, four men have been enabled to do the work previously done by 20.

A complete exhaust system for the paint tank reduces fume hazard to operators, and full explosion-proof equipment throughout assures safe operation.

Carry-over heat from the degreasing operation is used to control viscosity of paint in the dip tank. The latter is completely agitated and equipped with all necessaary dumping, draining, pumping and automatic fire fighting equipment. Conveyors now in use are 8 ft. wide and will carry parts up to 750 lb. weight. Each system is custom built.

New High-Quality Slide Rule Announced by Charles Bruning

Charles Bruning Co., 102 Reade St., New York, N. Y., has announced its new No. 2401, 5 in. pocket slide rule, designed for high-precision, high-quality and moderate price.

A notable feature of the slide rule is said to be the precision of its graduations. Being molded in, these graduations are an integral part of the rule and will not lose visibility through use. Graduations and numerals of the CI scale are in red to facilitate reading.

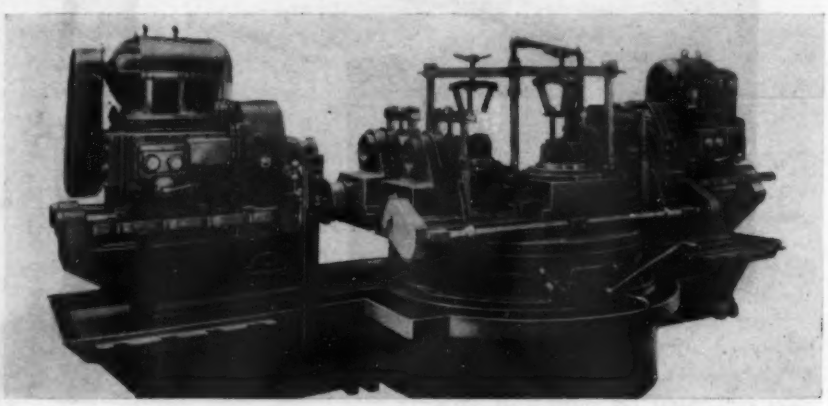
Curtis Announces New Two and Three Lamp Fluorescent Units

Curtis Lighting, Inc., 6135 W. 65 St., Chicago 38, Ill., has designed a new series of fluorescent industrial units for two and three 40-watt lamps. The units can be hung individually or in continuous lines for higher intensity by means of chains, conduit or cable.

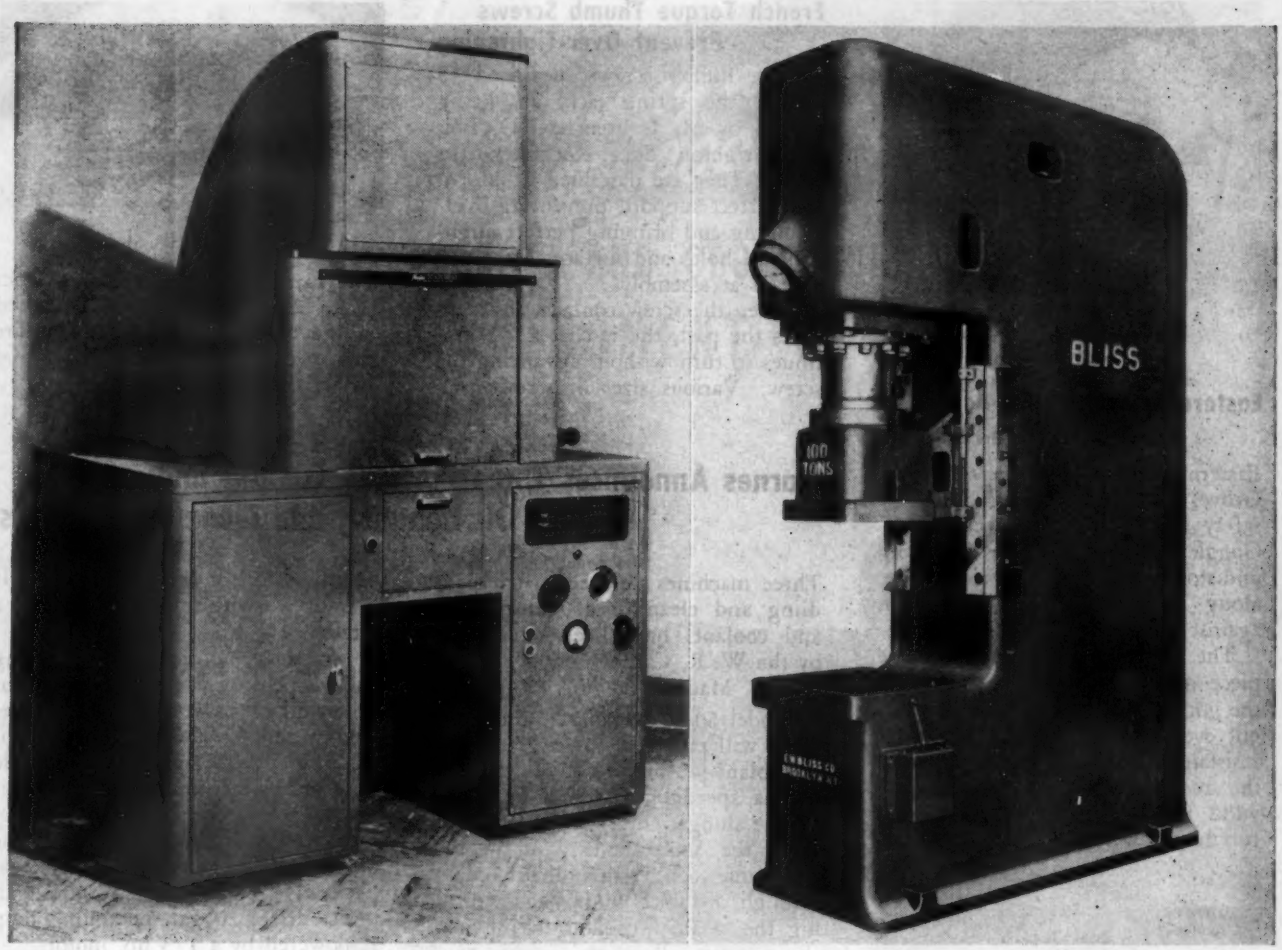
Outer surfaces of the reflector and housing are painted gray; inside white reflecting surface is of Fluracite. Housing and reflector are of steel. The ballast and starters are mounted on top of wiring channel. Units are wired for 110-120 v. and are 48 in. long and 12 9/16 in. wide.

Snyder Special-Purpose Rough and Finish Boring Machine Powered With Standard Hydraulic Units

Standard hydraulic units power a special-purpose axle housing rough and finish boring machine designed and built by Snyder Tool and Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. It is equipped with two Snyder guide-bar type, self-contained hydraulic units which provide both rotation and feed for the boring bars. By using hardened guide bars instead of ways, a considerable percentage of the wear



Snyder special-purpose rough and finish boring machine



Norleco electronic Searchray

Bliss 100 ton gap frame hydraulic press

which usually results from chip abrasions is eliminated.

The two fixtures are identical and each is equipped with adaptors for two different axle housings. These adaptors carry pilot bushings for the boring bars and the fixture end sections carry large bushings so that the tool is supported on both ends while going through the work. Fixtures are indexed manually on a clamp-type index table.

One part is bored in the working position while another part is being loaded in the front station or tools are being exchanged from rough boring bars to finishing bars. Electric push-buttons are provided for each end of the machine so that either end may be operated independently while the other is being hooked up between driving head and tool.

Searchray Does X-ray Work With Less Cost and Training

The new Norelco electronic Searchray, Model 150, manufactured by North American Philips Co., Inc., 100 East 42 St., New York 17, N. Y., is said to make possible discovery of internal flaws, cracks or foreign matter in aluminum, steel, copper, hard rubber parts, plastics, die castings, small electrical parts, tubes, etc. It is described as a versatile inspection tool that can be used in the assembly line, or in the industrial laboratory.

Searchray is said to give all the benefits of X-ray analysis without the expense of lead-lined rooms. It can be used by simply connecting with a 220 v., 60 cycle, single phase, a.c. power supply. An inexperienced operator can learn to use this equipment in a short time. The unit is rayproof, shock-proof and self-contained. All adjustments and operations can be made from one position.

A built-in fluoroscopic screen makes it easy to position the specimen and eliminates need of trial and error tests.

Bliss Company Builds 100-Ton Gap Frame Hydraulic Press Combining Rugged Frame With Smooth Enclosures

A 100 ton general purpose hydraulic press of gap frame construction has been built by the E. W. Bliss Co., 53 Street and 2 Avenue, Brooklyn 32, N. Y. Outstanding among the features of the new design is the combination of rugged frame construction and smooth enclosures. The slide is guided by adjustable gibs.

The press is arranged for manual control, but the electric control used on straight side single action presses is available for automatic reverse either by pressure or position. Various types of pumping units are available for different production requirements. For small production, the pumps are usually mounted in the frame of the press, while for high speed production, the pump is mounted on the top of the frame.

Among the specifications are: bed area, 20 × 20 in.; distance center line ram to throat, 15 in.; max. stroke, 18 in.; overall height, 145 in.; weight, 25,000 lb.; and speeds, in inches per min., closing, 58, pressing, 8½ and opening, 54.

Amcoweld Plasti-Goggle

Eastern Amcoweld Goggle is Strong and Non-Fatiguing

Eastern Equipment Co., Willow Grove, Pa., has introduced a new safety goggle, the Amcoweld Plasti-Goggle, which it describes as giving undistorted and unrestricted vision, along with maximum protection against impact hazards.

The Plasti-Goggle is made of one piece of clear Plexiglas. It is said the goggle can be worn all day without eye strain or fatigue, is spatter resistant, light in weight and, due to the smoothy rolled edges and ¾ in. wide full elastic headbands, comfortable to wear.

Taft-Peirce balancing stand

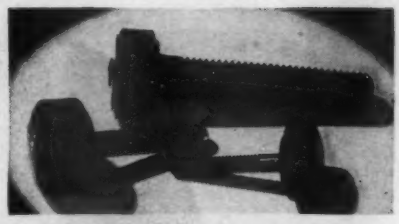
Taft-Peirce Balancing Stand For Surface Grinding Wheels

A balancing stand for surface grinding wheels, made by The Taft-Peirce Manufacturing Co., Woonsocket, R. I., consists of a cast iron base on which two hardened rails are mounted. The balancing arbor rolls freely on these rails to indicate balance of the mounted wheel. It will accommodate surface grinding wheels up to 7 in. dia.

French Torque Thumb Screws Prevent Over-Tightening

Torque thumb screws, designed to replace the spring jack, are being offered by M. J. French, P.O. Box 23, Brighton Sta., Rochester 10, N. Y. They are described as affording perfect support, preventing overclamping and bringing perfect alignment of holes and surfaces for greater ease at assembly.

When the screw contacts and supports the part, the ratchet knob continues to turn without advancing the screw. Various sizes of screws present maximum end pressures from 12 to 22 lb. Screws are hardened and have a rust-proof finish. They are said to reduce sharply scrap loss from distortion.



French torque thumb screws

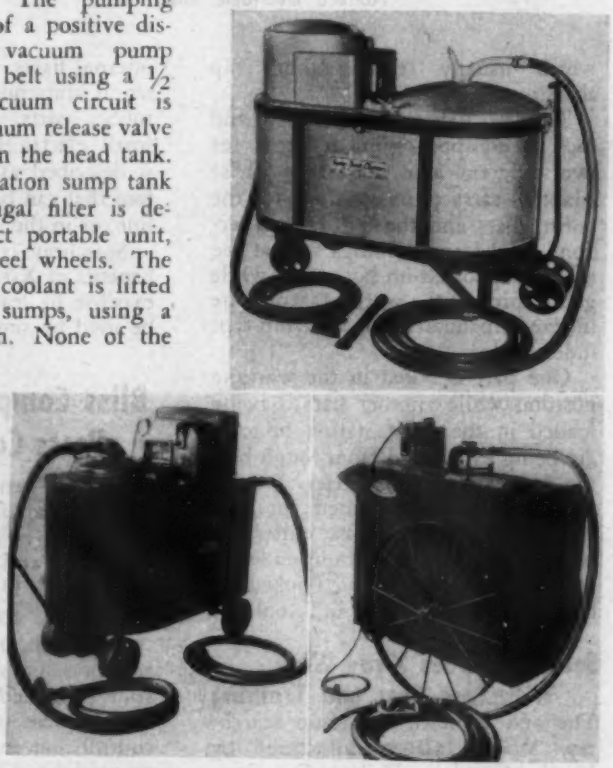
Carnes Announces Three Portable Coolant and Cutting Oil Handling and Cleaning Machines

Three machines devoted to the handling and cleaning of cutting oils and coolants have been announced by the W. R. Carnes Co., 2066 Helena St., Madison 4, Wis.

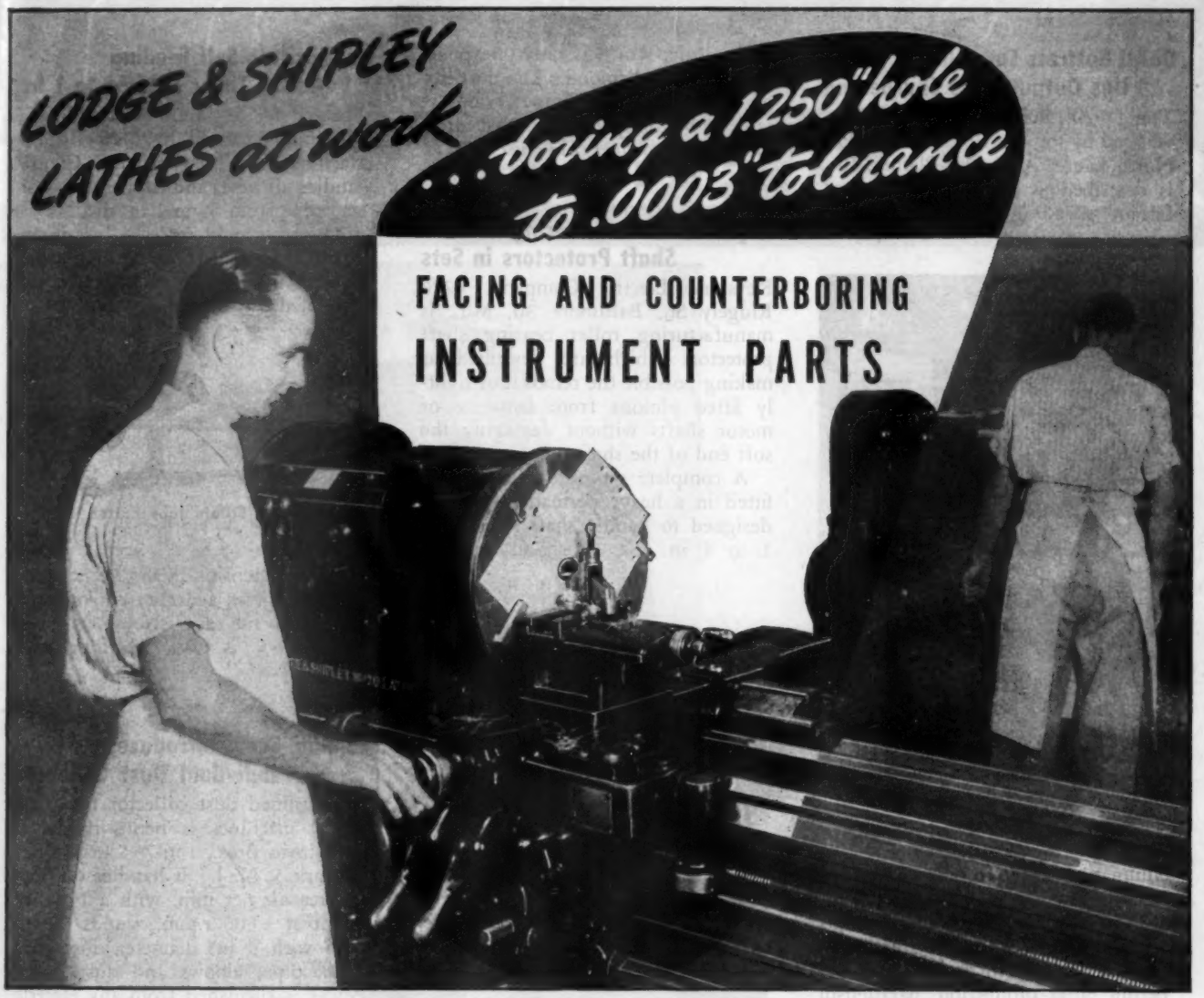
Model 50 sump tank cleaning machine will pump 30 to 35 gal. of oil or coolant per min. It is said to provide a speedy method of removing all the sludge, chips, oil and coolant from the sump tanks, and at the same time to filter this oil or coolant through a fabric filter bag, returning the cleaned coolant to the machine sump, all in one speedy continuous operation. The pumping equipment consists of a positive displacement rotary vacuum pump operated by a "V" belt using a ½ hp. motor; the vacuum circuit is equipped with a vacuum release valve and a float control in the head tank.

Model 70 combination sump tank cleaner and centrifugal filter is described as a compact portable unit, mounted on 8 in. steel wheels. The sludge laden oil or coolant is lifted from the machine sumps, using a high vacuum suction. None of the dirty oil passes through any pump, thereby eliminating all excessive wear on the pumps. The dirty oil is led directly into the centrifugal basket that has a fabric filter bag liner. As the cleaned oil leaves the centrifugal filter it is pumped right back into the machine sump. This model has capacity of from 25 to 40 gal. of oil or coolant per min. It it equipped with three motors, with a total of 1¾ hp.

Model 115 combination mixing and dispensing truck takes concentrated oil or paste compound, mixes it with added water and dispenses it through a 10 ft. long wet nozzle hose to the machine sump. There is no need for separate mixing equipment and hence the handling of the oil or coolant is reduced. Tank capacity is 75 gal. The centrifugal, direct drive, 20 gal. per min. pump is powered by a 1/3 hp. motor.



Carnes combination sump tank cleaning machine (top right), sump tank cleaner (lower left) and combination mixing and dispensing truck (lower right)



at WRIGHT'S AUTOMATIC MACHINERY COMPANY . . .

For more than 50 years, Wright's Automatic at Durham, N. C., has pioneered in the development and manufacture of automatic packaging machinery. To manufacture these marvels of mass production packaging, the lathes selected were required to possess unusual versatility, yet maintain accuracy to very close tolerances.

Lodge and Shipley Engineers recommended 16"/20" Selective Head Lathes with Roller Bearing Spindle Mounting. With these Lathes, Wright Automatic performs a wider range of work than is ordinarily possible, with greater selection of speeds, feeds and threads available.

Today, Wright's are entirely devoted to producing naval gun-fire control instruments which require close tolerance boring and turning. Here, too, Lodge and Shipley 16"/20" Lathes perform with equal facility.

To turn better, more profitable work, call on L & S Engineers. For details on the 16"/20" Lathe, write on your company letterhead.

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI 25, OHIO, U. S. A.

L & S LATHES

ENGINE — TOOL ROOM — AUTOMATIC — OIL COUNTRY LATHES

DoAll Buttress Saw Blade Ups Output, Cuts Sharpening

The DoAll Buttress saw blade, developed by the DoAll Company, 254 North Laurel Ave., Des Plaines, Ill., is described as eliminating operator fatigue, speeding up production and

DoAll Buttress saw

eliminating costly resharpening and resetting.

It will cut ferrous and non-ferrous alloys and also non-metallic materials. Innovation in teeth design is said to permit rapid production, parallelism and close tolerance over the entire finished cut. Tooth gullets are elongated to provide plenty of room for fast removal of chips.

The DoAll Buttress saw is manufactured in widths from ¼ in. to 1 in., with various sets and pitches.

Ferem Blue Temper Floors Have Blue Steel Ductility

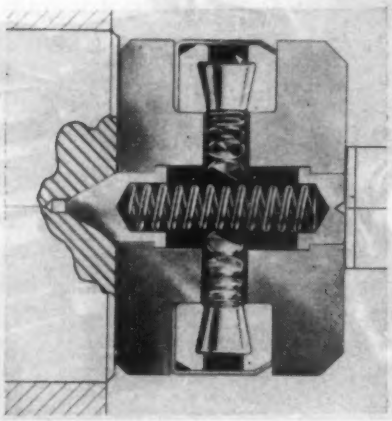
Ferem, a complete material containing the desirable characteristics of hardness, admixture and processed components is announced by A. C. Horn Co., 43-36 10 St., Long Island City 1, N. Y. as the means of constructing tough, durable floors which are not slippery, show no noticeable wear for long periods and involve practically no upkeep cost. This "Blue Temper" component contains no sand, stone or silica and requires only the addition of cement and water. Floors made therefrom are said to be unusually resistant to wear, water and chemical distintegration.

The principal component of Ferem has a rating of 9 in hardness in the Mohs scale, which is only one point less than the diamond. The ductility of a Ferem "Blue Temper" floor is said to be comparable to that of a blue tempered steel cold chisel.

Keystone Roller Bearing Shaft Protectors in Sets

Keystone Electric Company, 1220 Ridgely St., Baltimore 30, Md., is manufacturing roller bearing shaft protectors which are described as making possible the removal of tightly fitted pinions from armature or motor shafts without damaging the soft end of the shaft.

A complete set of the protectors, fitted in a heavy permanent case, is designed to handle shaft sizes from 1 to 4 in. dia. Inserted between



Keystone roller bearing shaft protector

the puller stud and the soft motor shaft, the rotating plug is fitted with a movable female center to adapt the shaft protector to the end of the screw stud. As soon as pressure is applied, the rotating plug turns freely on the roller bearing and with the screw stud.

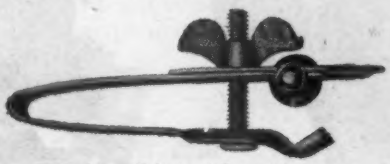
Synkrete Concentrate Stops Cement Dust, Hardens Surface

Synkrete concentrate, product of Synthex Products Co., 2 West 45 St., New York 19, N. Y., is described as soaking deep into the pores of dusting concrete where it hardens to form a rocklike water insoluble mass that reinforces the binder and prevents surface particles from being worn away. The liquid is almost colorless and does not affect appearance of floors. It is applied by mop, brush, long handled broom or sprinkler. Coverage is at least 1,000 sq. ft. per gal.

New Britain Self Feeding Cutter Takes Pipe ⅝ to 1 In.

The self-feeding tube cutter, No. T-130, manufactured by New Britain Machine Co., New Britain, Conn., handles all tubes and copper, brass or lead pipe from ⅝ to 1 in. dia.

This device is described as doing a swift, precise cutting job. After the tube is inserted in the cutter and tightened, it does not have to be



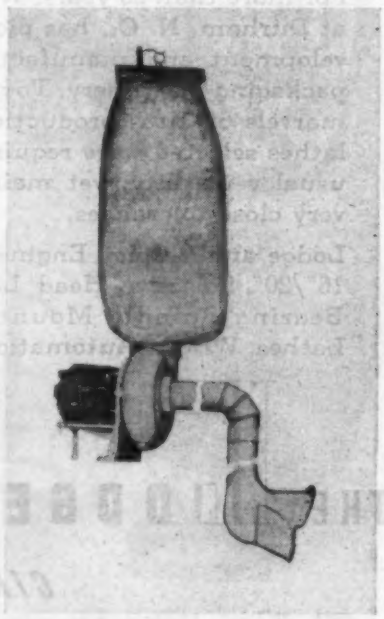
New Britain tube cutter

reset. The tension in the frame automatically gives a deeper cut on each turn, until the tube is severed.

The tool is 5¼ in. long and weighs 6 oz.

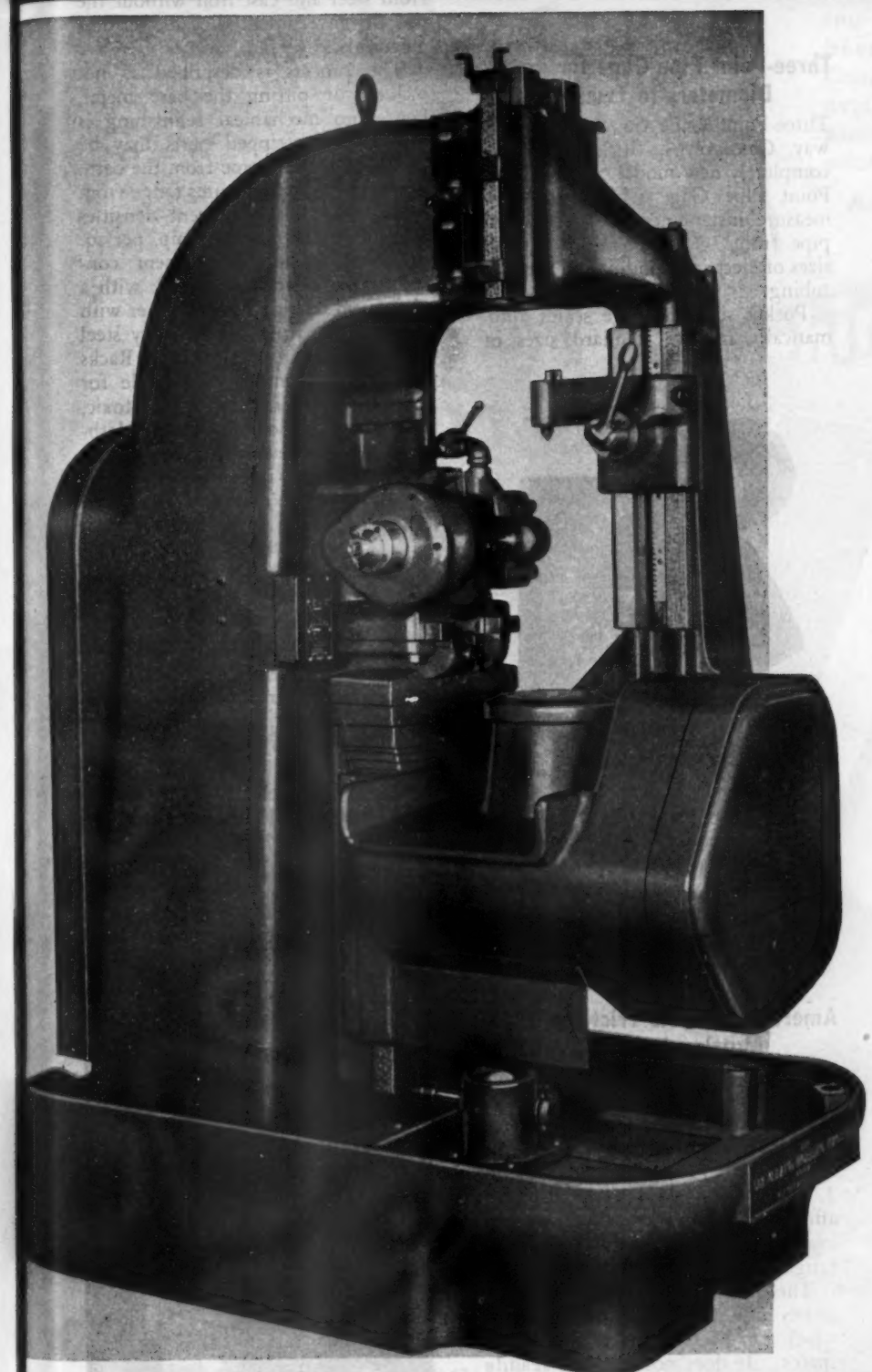
Leiman Bros. Introduces Indivdual Dust Collector

A simplified dust collector for individual machines is being produced by Leiman Bros., 136-75 Christie St., Newark 5, N. J. It handles 600 cu. ft. free air per min. with a 1/4 hp. motor at 3,500 r.p.m., stands 47 in. high with 9 in. diameter dust bag, 3 in. pipe, elbows and dust hood. Power is furnished from any electric light socket. It is adapted for use with grinding and polishing wheels or any other dust creating tool.



Leiman Bros. individual dust collector

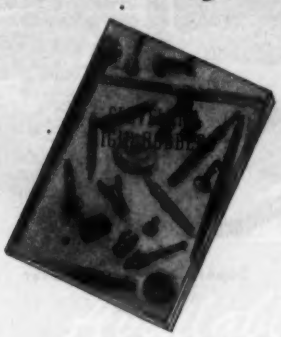
For Accurate Gears and Splines
THE RIGIDHOBBER



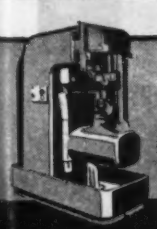
● Here is a high production, low cost method of producing precision spur and helical gears —straight and helical splines.

One of the features productive of accurate work is the rigid support to the work head both above and below work—eliminating spring in either the work or the hob.

Another point in design which makes for economy is interchangeability of all feed and index gears. These are all of the same pitch and have same bore and keyway. They may be interchanged for various setups. Although gears run in oil they are easily changed without draining oil as the upper section of the cover may be removed for easy access to gears. These are but a few of the many advantages in time and cost savings possible on the Rigidhobber.



For full details write for this bulletin telling all about Rigidhobbers—what they are—what they will do—and how they can reduce costs.



The CLEVELAND HOBBING MACHINE Company

General Offices:
1311 CHARDON ROAD
CLEVELAND 17, OHIO

Chicago Office:
624 S. MICHIGAN AVE.
CHICAGO 5, ILLINOIS

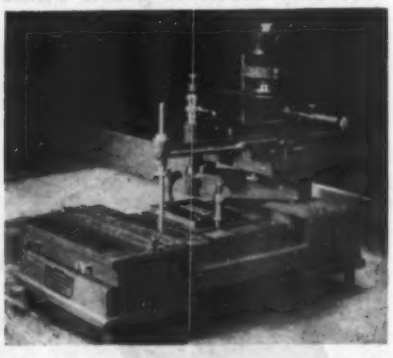
BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS

Aget-Detroit pre-cleaner and power unit

Dustkop Pre-Cleaner Unit With Large Storage Capacity Ready

A new pre-cleaner unit, to be used in conjunction with Model 600 Dustkop dust collector, and having exceptionally large storage space for air drawn refuse from various types of buffing, polishing and similar operations, is available from Aget-Detroit Co., 602 First National Bldg., Ann Arbor, Mich. The storage bin, which has a capacity of 2 cu. ft., is sealed by a sliding panel which is raised to permit access to the bin for emptying.

Installation of the new pre-cleaner is said to be quick and simple.



Super-Cut auto engraver

Untrained Workers Operates Super-Cut Auto Engraver

Super-Cut Model No. D2 auto engraver, for engraving, duplicating and profiling small parts, is announced by Auto Engraver Co., 1776 Broadway, New York 19, N. Y.

This model is powered by a universal motor, 115 v., a.c.-d.c.; it has micrometer depth control, has two Hi-speed steel cutters, one copy holder, two copy holder clamps and 6 work table clamps. The work table is 11 × 5 in., while vertical movement of the arms goes up to 2½ in. A font of ⅛ in. block letters and numerals is included.

The Super-Cut is said not to require a skilled operator. It will engrave on round or flat surfaces and cuts smooth lines.

Three-Point Pipe Gage for Diameters to Twelve Inches

Three-Point Gage Co., 3821 Broadway, Chicago 13, Ill., announces a completely new model of the Three-Point Pipe Gage which will now measure instantaneously all sizes of pipe from ⅛ in. to 12 in. and all sizes of electrical conduit and metallic tubing.

Pocket size, the gage scales automatically register standard sizes of

Three-Point pipe gage

electrical metallic tubing and conduit, and also the correct sizes of pipe in terms of inside diameter. A third scale shows the right drill size for tapping.

Ameritred Plastic Friction Matting Is Now Available

Ameritred, a solid plastic friction type matting, made by binding friction compound firmly together, has been made available by American Mat Corp., 1799 Adams St., Toledo 2, Ohio. It is said to lie flat and afford a non-slip surface, while keeping feet off cold floors and reducing fatigue.

The mat is jet black in color, comes in 29 × 63 × 9/64-in. sheets which can be trimmed to fit smaller spaces. It does not swell as readily as rubber where exposed to various types of oils. It is said to be easily trimmed to fit.

Unichrome Stripping Bath Has no Critical Chemicals

Unichrome Alkaline Stripping Bath, available from United Chromium, Inc., 51 East 42 St., New York 17, N. Y., has been developed to remove copper, chromium, cadmium zinc, tin and other electrodeposited metals from steel and cast iron without the use of government-allocated critical chemicals.

The process is described as not etching or pitting the base metal, hence, no mechanical refinishing is needed and stripped parts may be used just as they come from the bath.

Operating temperatures range from 80 F. to 180 F. Current densities range from 100 to 175 amp. per sq. ft. Recommended equipment consists of an unlined steel tank with a plain steel heating coil, together with facilities for rinsing. Ordinary steel or copper electrodes are used. Racks suitable for plating are suitable for stripping. The solution is non-toxic, non-corrosive, does not attack clothing or equipment and gives off no objectionable or injurious fumes during operation. Ventilation is needed only where high amperages are used.

Vlchek-Kimball-Tenite Goggles Light, Comfortable

Shatterproof Tenite plastic frame safety goggles are being molded by Vlchek Tool Co., 87 and Koster Sts., Cleveland, Ohio, for The Kimball Safety Products Co., 7312 Wade Park Ave., Cleveland, Ohio. Tenite is a product of Tennessee Eastman Corp., Kingsport, Tenn. The goggles are described as providing full protection plus the utmost in comfort and being light in weight. The extra large lenses permit unobstructed vision. Lenses are interchangeable so that different colors may be inserted.

Vlchek-Kimball Tenite goggle

What you want to know about Broaching

Answers to most questions on broaching methods and applications have been prepared by Colonial Broach Company, Detroit. Your copies are now available upon request on your company letterhead. Here are some of the printed bulletins now ready for mailing.

Ask for them by Bulletin Number.

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Available soon —

The most complete manual on broaching and catalog of broaching equipment ever published. Reserve your copy now.

Carboloy Increases Line of J. & L. Roller Turner Tools

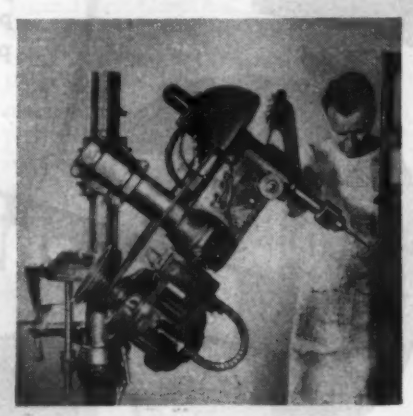
Addition to its standard stock tool line of a series of Carboloy Cemented Carbide tipped tools designed for Jones & Lamson roller turners has been announced by Carboloy Company, 11155 E. 8 Mile Road, Detroit 32, Mich. They range in size from ⅜ × ½ in. shank size to 1 × 1¼ in. shank. The tools are regularly furnished with tips for 78B steel cutting grade of Carboloy Cemented Carbide. They are designed for J. & L. roller turners No. TX536, 537, 805, 813, 865, 873, 875, 876 and 1013.

Nobur Angle Brack Makes Drill Press Widely Versatile

Just announced by the Nobur Manufacturing Co., 910 North Orange Drive, Los Angeles 38, Calif., is a new angle bracket described as capable of converting any drill press into a versatile, all purpose machine for angle drilling, polishing, buffing, sanding, rotary filing, wire brushing, tapping, reaming, burring, grinding, honing and other uses.

Spindle angles can be adjusted to any height, placed horizontally or vertically, at any angle, and can be set for greater convenience and operator comfort. It fits the machine to the work and hence gets more work out of the machine.

The angle bracket is available for all popular models of drill presses whose construction embodies a 2¾ in. to 3 29/32 in. tubular column.



Nobur drill press angle bracket

Alemite electric portable grease gun

Alemite Electric Portable Power Grease Gun Announced

A new Alemite electric portable power grease gun, Model 7190, is announced by the industrial Alemite division, Stewart-Warner Corp., 1826 W. Diversey Parkway, Chicago.

The new gun has been developed to deliver fast, positive high pressure lubrication with all types of lubricants that seek their own level. Large heavy duty wheels and a ball bearing front caster facilitate mobility.

A mercury switch automatically shuts off the 1/3 hp. electric motor when 5,000 lb. pressure has been built up in the delivery hose. The gun has an easily accessible check valve and pressure release valve. Equipment includes a 12 ft. electric cord, a 6 ft., ¼ in. 20,000 lb. burst pressure hose and control valve with hydraulic coupling, combination handle, cord and hose rack. The gun stands 28½ in. high, 15 in. wide and 26 in. long.

Gear Grinding Machine Company Announces New Heavy-Duty Formed Wheel Grinding Machine

A new heavy-duty formed wheel grinding machine, Geargrind Type GG-24-48, has been announced by The Gear Grinding Machine Co., 3939 Christopher St., Detroit, Mich. This new grinder handles either coarse or fine pitch gears with diameters up to 24 in. It takes 48 in. between centers.

The machine is said to more than double production through its much faster indexing, more rapid travel of the work table to and from the work, simplified push button controls and operator convenience.

The index control is such that indexing can function at both ends of the stroke or on the tail stock end only. The index cycle stop is selective from 0 to 400 indexes and may be adjusted at any point in the cycle.

Travel of the grinding wheel carriage to wheel trimming position is automatic and can be made after any predetermined number of cycles or can operate as a tooth to tooth index. In case of index failure, an electrically interlocked safety circuit stops all movement of the grinding wheel car-

The motor driven work-head spindle permits checking the work runout with an indicator. This spindle is mounted on precision tapered roller bearing.

The 38 in. dia. index worm wheel is driven by a precision hardened and ground worm 4½ in. in dia., mounted on precision tapered roller bearings. Both worm and wheel run in oil. The index change gears are hardened and precision ground.

This machine takes either a 4 to 1 or a 6 to 1 trimmer.

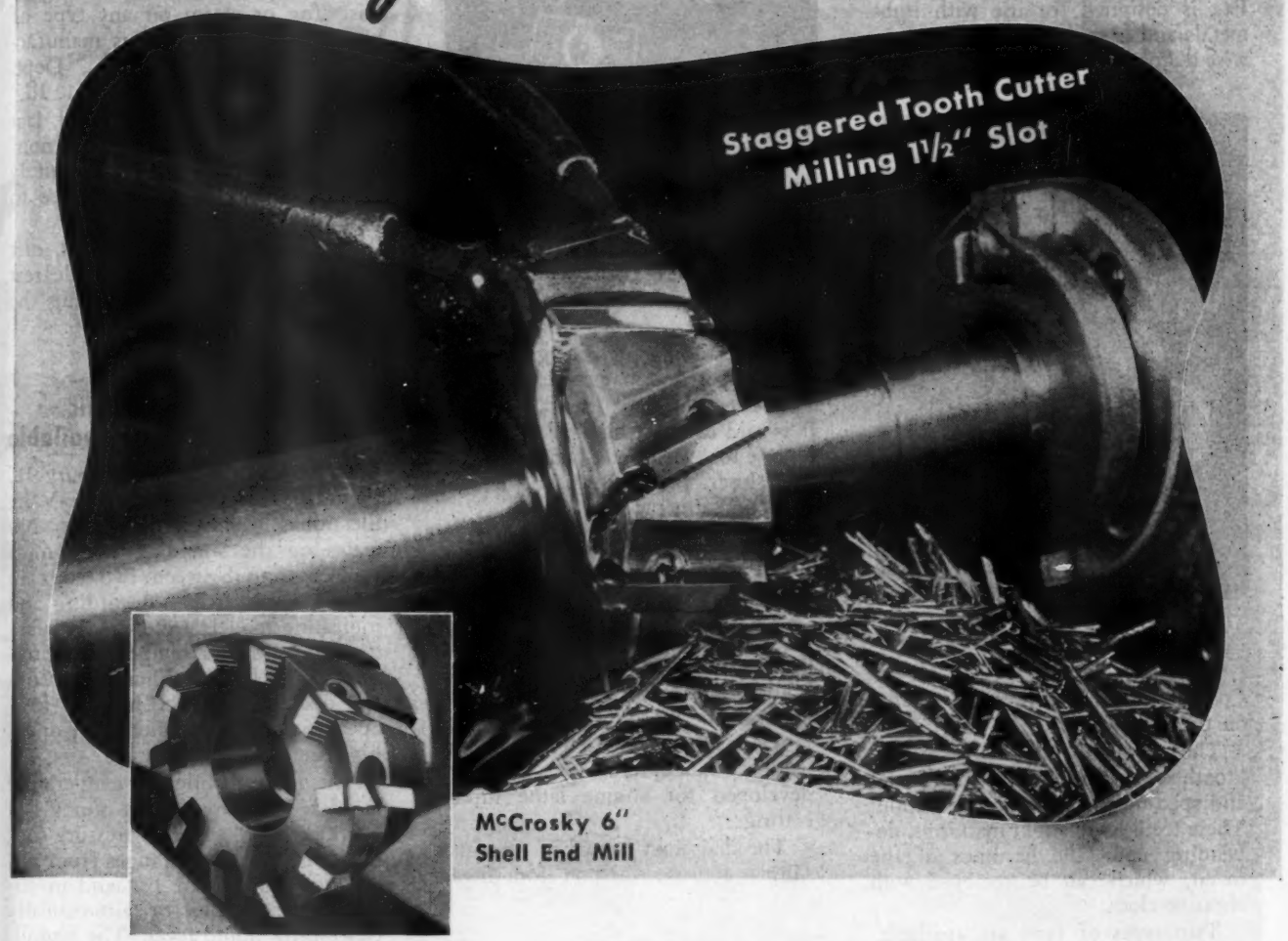
Geargrind Type GG-24-48

Floquil Fountain Marker Works on Many Materials

The Floquil Fountain Marker, developed by Floquil Products, Inc., 1974 Broadway, New York 23, N.Y., is described as capable of marking more than 100 basic materials, including wood, plywood, paper, glass, plaster, rubber, asbestos, aluminum, brass, copper, cellophane, wax surfaces and textiles. It is said to mark both wet and dry surfaces. There are 12 instantly interchangeable nibs requiring no tools to take off or put on.

There are seven standard Floquil Transparent Colors for use with these markers. These colors are described as instantly drying, water, weather and abrasion proof.

McCROSKY *Jack-Lock* MILLING CUTTERS



McCrosky 6"
Shell End Mill

HANGING from 3" to 20" in diameter, and fitted with high-speed steel, cast alloy, or carbide tipped blades, McCrosky face mills, end mills, half side, and staggered tooth milling cutters meet every requirement. Each is a typical McCrosky tool, giving users the advantages of McCrosky's many service-proved features, including the patented Jack-Lock blade locking device.

Conceived and perfected by McCrosky engineers, the "Jack-Lock" gives inserted blade tools the strength and rigidity of solid tools—yet permits quick and easy release of the blades for adjustment, regrinding or replacement.

Specify McCrosky—leader for 40 years—for "Standard" milling cutters, or "Specials" that do 3, 4, 5 or even more related boring, counter-boring, facing and reaming operations at the same time, increasing production and cutting costs!

Send for a copy of the McCrosky No. 16-M Milling Cutter Catalog. It gives full details.

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

COST CUTTING TOOLS

Designers and Manufacturers of

Jack-Lock MILLING CUTTERS
Block Type BORING BARS
Wizard CHUCKS AND COLLETS
Super Adjustable REAMERS
Turret TOOL POSTS

C-B Metal Shrinker Speeds Operation and Cuts Cost

The Model B Metal Shrinker developed by C-B Tool Co., Lancaster, Pa., is designed for use with light metals and is said to speed an otherwise tedious and expensive operation.

C-B Metal Shrinker

Control lies in the pressure exerted on the handle.

The jaws of the Shrinker are "toothed" better to grip the metal and sped up the shrinking operation. These teeth leave slight markings, depending upon the hardness of the metal, which can be removed with abrasive cloth.

Two types of jaws are available: 0.006 in. for aluminum and lighter metals and 0.009 in. teeth for heavier metals, extrusions and galvanized metal.

Two $\frac{3}{8}$ in.-16 thread holes of $2\frac{1}{2}$ in. center to center, are provided for bench mounting.

Cyclograph Speeds Checking, Evaluating and Sorting

The Cyclograph, announced by Allen B. DuMont Laboratories, Passaic, N. J., operates either as an electronic analyzer or as an automatic sorter. As the former, the Cyclograph grades pieces of metallic material according to case depth, depth of decarburization, amount of cold working, brittleness (stress gradients); hardness gradients or structure.

The Cyclograph will sort metal parts or materials according to one of the following factors, if all other variables are reasonably constant: Analysis; heat-treatment; structure; size; wall thickness of tubing; thickness of cladding or plating; whether magnetic or non-magnetic.

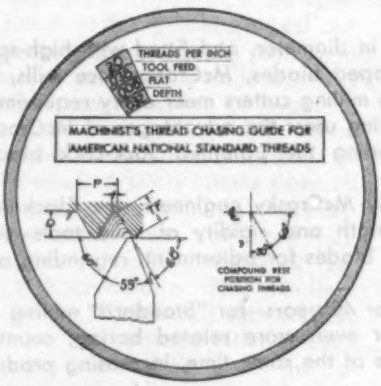
DuMont Cyclograph

The instrument is leased, not sold. It is said to effect marked savings in time, effort, materials, while providing closer production control and more uniform product.

Hazelton Chasing Guide Speeds Engine Lathe Thread Cutting

Burton Hazelton Specialties, 312 East Bodley, Kirkwood 22, Mo., has announced the machinist's thread chasing guide, which it describes as the handiest quick reference chart ever developed for engine lathe thread cutting.

The dial chart is said to present a simple accurate method for thread cutting, as well as set-up, compound rest and thread form diagrams.



Hazelton thread chasing guide

The reverse side of the chart selects a national coarse or national fine machine screw and shows the threads per inch, the tap drill size and the body drill size for a machine screw.

The guide is said to save time, while making engine lathe thread cutting a positive procedure.

Merix Compound Prevents Fog And Cleans Glass or Plastic

Merix, a new anti-fog compound described as preventing the forming of mist, fog or steam on any type of glass or plastic surface, is manufactured by Merix Photo Co., Dept. 52, Wrigley Bldg., Chicago 11, Ill.

It is said to be easily applied, last a long time, non-flammable, non-toxic, non-acid, keeps indefinitely and is not affected when exposed to light.

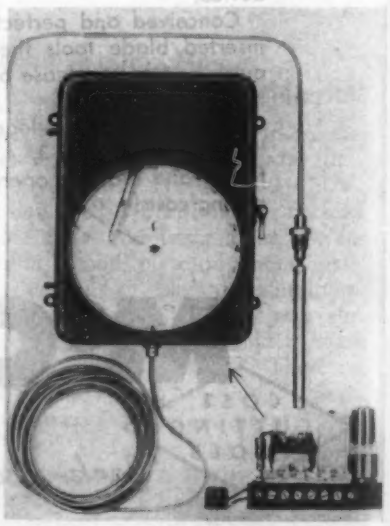
The compound removes dust, dirt or fingerprints and assures clearest possible vision, without marring the softest plastic.

Bristol Free-Vane Electronic Controller is Now Available

The Bristol Company, Waterbury 91, Conn., has announced its Free-Vane Electronic Controller, which operates on the shielding effect of a vane passing between two coils in an electronic circuit. Recording and indicating models are offered for automatic control of temperature, pressure, liquid level and humidity. Control operation may be had for low-open, high-open, low-high, low-open-high and low-normal-high.

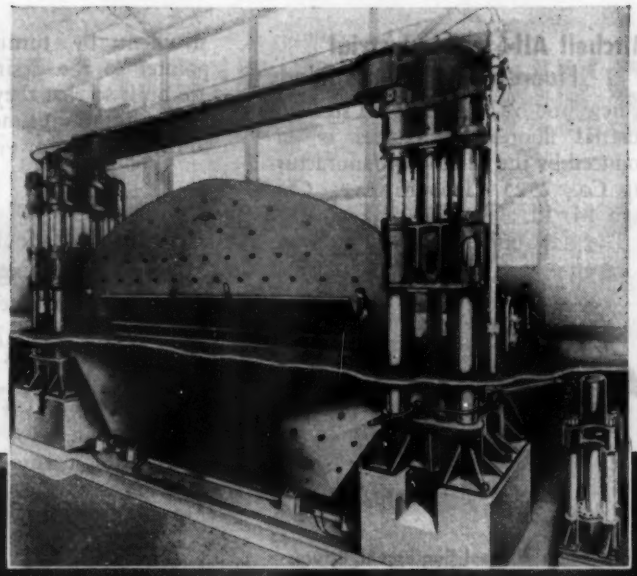
The new controller for temperature is offered in ranges from minus 125 F. to plus 1,000 F. The pressure controller is available in ranges from full vacuum to 6,000 lb. psi. and in addition is available for automatically controlling liquid level. The humidity controller operates from a wet and dry bulb type of element with a separate control for each bulb.

This type of controller is also offered as a time-program controller.



Bristol Free-Vane electronic Controller

12,000,000 lbs of Extra Effort for Production Economy



This Baldwin Southwark press—probably the largest of its kind in the world—shapes steel up to SIX INCHES THICK and in lengths of 40 feet and under; just what the customer asked for.

There will probably be a place for a hydraulic press in your post-war production activities. Let Baldwin design and build it for you. Baldwin engineers have built thousands of presses to meet all sorts of needs, and this experience will help you do a good job.

Put this extra effort to work in your plant for extra economy in production. The Baldwin Locomotive Works, Baldwin Southwark Division, Philadelphia, Pa., U. S. A. Offices: Philadelphia, New York, Washington, Boston, Cleveland, Chicago, St. Louis, Houston, San Francisco Pittsburgh.

BLW THE BALDWIN GROUP

BALDWIN

SOUTHWARK

HYDRAULIC PRESSES

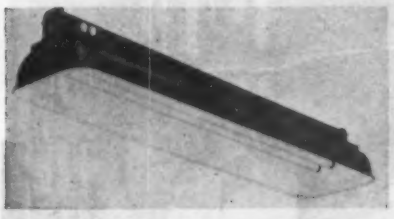
BALDWIN PRODUCTS

Hydraulic presses, Testing equipment, Steel forgings and castings, Diesel-electric locomotives, Diesel engines, Metal plate fabrication, Rolled steel rings, Bronze castings, Heavy machine work, Crane wheels, Bending rolls, Plate planers, Babbitt metal, Alloy iron castings, Briquetting presses.

Mitchell All-Steel Industrial Fluorescent Fixtures Ready

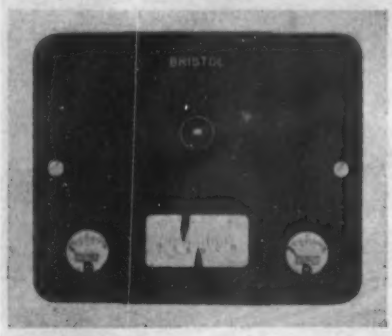
A new line of Mitchelite all steel industrial fluorescent fixtures is announced by the Mitchell Manufacturing Co., 2525 Clybourn Ave., Chicago 14, Ill.

The new units include 2-40 watt,



Mitchelite all-steel fluorescent fixtures

3-40 watt and 2-100 watt models, with choice of open-end or closed-end reflectors, in baked enamel or porcelain enamel finish. New, perfected Instant-Start feature is available on the 2-40 watt models. Wireway channels and reflectors are constructed of heavy gage steel. Units are finished in battleship gray outside.



Bristol air-operated control instrument

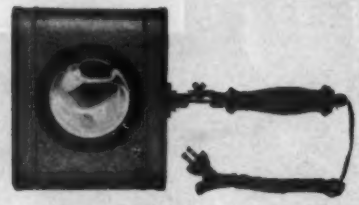
Bristol Adds to its Line of Air-Operated Controllers

The Bristol Co., Waterbury 91, Conn., has announced the development of a new, Model 93, series of indicating air-operated control instruments. The new instruments are built for controlling temperature, pressure, vacuum, liquid level and humidity.

They operate on free-vane principle of automatic control. They have throttling range of from ½ of 1 percent to 15 percent, with adjusting mechanism arranged so that changes in the throttling range can be made by the user without the need of tools. They can be set to control at any value within the range of the instrument by turning the control pointer to the desired value. They are built so that they can be changed by a finger adjustment from reverse to direct action or vice versa.

Lowe Hand Inspector-Lite Aids Checking Large Objects

Hand Inspector-Lite, a portable device designed to aid proper inspection of large objects, is being made by S. Lowe & Sons Co., 30 Sanford St., Fairfield, Conn. It is described as also being ideal for use in setting-up all types of machine tools, since it is



Lowe hand Inspector-Lite

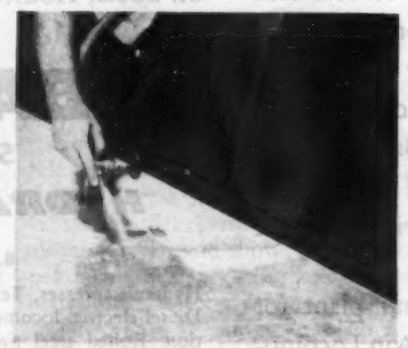
portable and can be used to get into small places.

The Inspector-Lite is adjustable, light and easy to handle. Strong illumination is supplied by two tubular Mazda bulbs and a 4 in. ground optical lens properly magnifies the object being inspected.

Kodak Materials Transfer Layout Direct to Metal

Kodak Layout Paint and Kodak Layout Primer, materials for a simplified method of printing working drawings directly on metal have been announced by the Eastman Kodak Co., Rochester, N. Y. The new method is said to be of widespread applicability for the production of products involving flat metal parts.

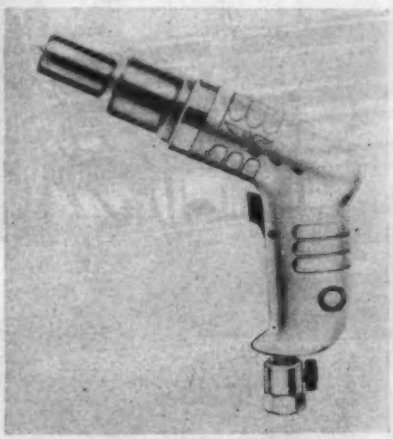
The Layout Paint is sprayed in



Kodak Photo-Layout materials

ordinary room light directly on virtually any primed metal surface with a conventional spray gun, after the surface has been cleaned reasonably free of loose dirt and grease. Drying is rapid and the prepared metal is then ready for immediate use or it can safely be stored for a reasonable time in a dark place.

The drawing, previously made on a transparent or translucent material, is next laid in contact with the prepared surface and a few minutes exposure made to arc or mercury vapor lights. The drawing is removed and the metal flooded with warm, weak ammonia water. A vigorous spray of tap water follows which washes away the entire exposed coating, leaving only white lines where black lines appeared in the drawing. Another thin coat of Layout Paint Primer protects the finished product.



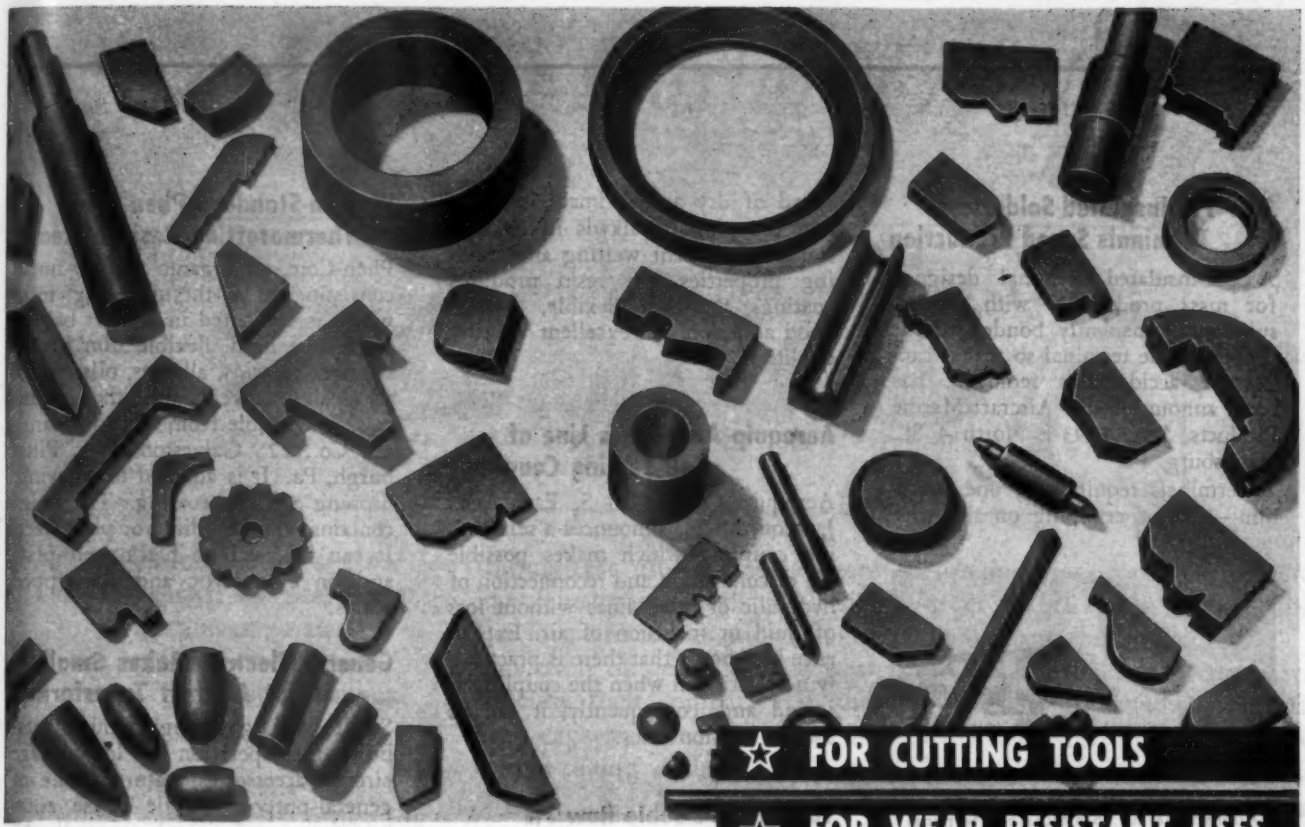
Aro impact screwdriver

Aro Announces New Impact Screwdrivers and Nut Setters

A new line of impact screwdrivers and nut setters with positive torque control is announced by The Aro Equipment Corp., Bryan, Ohio. A torque regulator located in the handle, allows the operator easily to regulate the torque necessary to tighten the screw or nut. Pneumatically powered, the tool operates with a roller clutch impact mechanism having only four major parts—anvil, hammer and two cylindrical steel rollers.

Model 1011 impact screwdriver will accommodate Phillips, Reed and Prince or standard chisel point bits and finders for slotted screws. The Model 1012 impact nut setter is available with 9/32 in. or ⅜ in. square drive adapter for sockets. Each weighs 2 lb. 2 oz. and is 7 in. overall length.

SPECIAL-SHAPED CARBIDE BLANKS



Modern technique in forming cemented carbide permits fast, economical service on a wide range of shapes and sizes of Carboloy blanks for all purposes. Whether your requirements are for single shapes just slightly "off-standard" or for intricate contours such as on form tools, Carboloy blanks can be supplied promptly and economically. Close tolerances—requiring minimum grinding time—are provided.

Call upon us for all your special-shape carbide blank requirements—for use on your special cutting tools, as well as for wear-resistant uses on your machines and products.

CARBOLOY COMPANY, INC.
11149 E. EIGHT MILE ROAD, DETROIT 32, MICHIGAN
BIRMINGHAM • CHICAGO • CLEVELAND • LOS ANGELES • MILWAUKEE • NEWARK
PHILADELPHIA • PITTSBURGH • THOMASTON, CONN.
Also sold through many leading Mill Supply Distributors

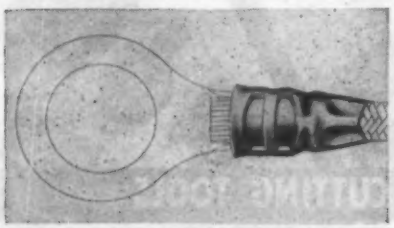
CARBOLOY TRADEMARK
For Cutting CAST IRON and Non-Ferrous Metals
For Cutting STEEL
TUNGSTEN CARBIDES ★★★ TUNGSTEN CARBIDES WITH TANTALUM AND/OR TITANIUM CARBIDES

Parts and Materials

AMP Pre-Insulated Solderless Terminals Speed Production

A pre-insulated terminal designed for mass production, with the insulation permanently bonded to the copper of the terminal so that it cannot be accidentally removed, has been announced by Aircraft-Marine Products, Inc., 1593-L North 4 St., Harrisburg, Pa.

Terminals require only one operation—that of crimping on the wire



Aircraft-Marine preinsulated terminal

with AMP precision installation dies. The pre-insulation takes the exact contour of the crimp without distortion, cracking or drying out in use.

Identification of terminals and matching dies is aided by marking each of the two sizes with distinctive color.

Duraplex Coating Resin Airdries Protective Paints

Development of a new low cost, drying-oil type resin adapted to airdying finishes, is anounced by the Resinous Products & Chemical Co., 222 W. Washington Sq., Philadelphia, Pa. Known as Duraplex AL-210, the resin is designed for use in protective paints for freight cars, structural steel, aluminum paints, red lead primers, shingle stain reinforcing, barracks, paints, trim and trellis paints and all kinds of industrial maintenance.

The new resin contains only 50 percent reportable oil—thus providing a practical means of extending oil quotas.

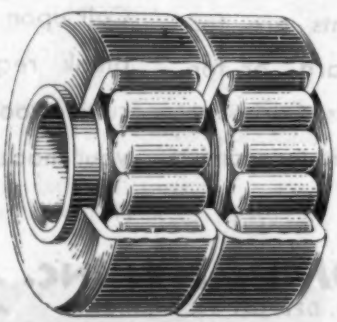
Resembling bodied linseed oil in speed of dry and ultimate hardness and the phthalic alkyds in its outstanding pigment wetting and binding properties, the resin produces coatings that are flexible, possess good adhesion and excellent wearing qualities.

Aeroquip Announces Line of Self-Sealing Couplings

Aeroquip Corp., 310 S. East Ave., Jackson, Mich., announces a self-sealing coupling which makes possible the disconnection and reconnection of hydraulic or other lines without loss of fluid or inclusion of air. Experience has shown that there is practically no restriction when the coupling is joined and, consequently, it can be used in suction lines.

Torrington Double Row PN Aircraft Needle Bearings

A double row PN needle bearing, described as having a friction coefficient as low as that of any other type anti-friction bearing, has been an-



Torrington PN needle bearing

nounced by The Torrington Co., Torrington, Conn., as specially designed to minimize friction in aircraft pulley applications while conforming to all requirements of Specifications AN-FF-P-796.

Its enclosed design provides ample space for retention of the lubricant without danger of excess grease being present.

Watson-Standard Phen-Cote Thermosetting Resin is Ready

Phen-Cote, an organic surface finish consisting of a thermosetting resin which is converted in a short baking cycle to a hard, flexible film highly resistant to acids, alkalies, oils, greases, alcohol, solvents and other chemicals, is available from Watson Standard Co., 225 Galveston Ave., Pittsburgh, Pa. It is adapted to spraying, dipping or roller-coating. The finish contains no oil modifier or plasticizer. It can be used on black iron plate and on electrolytic and hot-dipped plates.

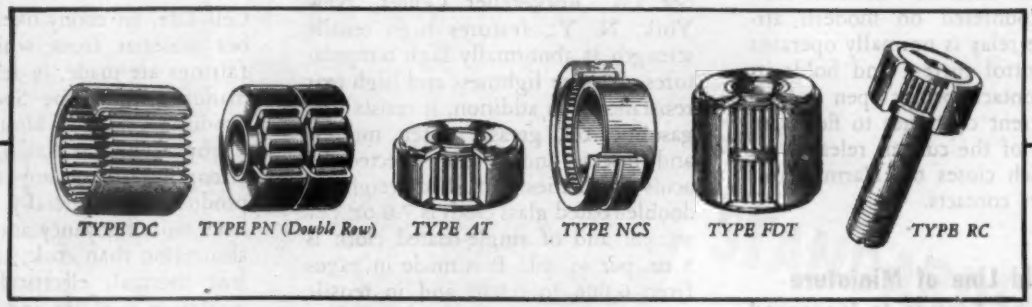
General Electric Makes Small, Light Aircraft Transformer

Small size, light weight and adaptability for operation of low-voltage aircraft accessories feature a line of general-purpose, single phase autotransformers designed especially by General Electric Co., Schenectady 5, N. Y., for operation from line-to-neutral of 400-cycle, 120/208 Y-volt aircraft electrical systems. Combination of a new high-grade core steel and glass insulation impregnated with a new inorganic resin makes possible the small size and light weight. Suitable for operation at any altitude from sea level to 60,000 ft., the units will function in temperature from —40 to 140 F. They operate over a frequency range from 380 to 420 cycles, and are suitable for continuous use at an overvoltage of 5 percent.

Micro Split-Contact Switch Can Control Isolated Circuits

Two sets of controls are mechanically interlinked but electrically isolated in the double-throw split-control micro switch available from Micro Switch Div., Freeport, Ill. It is possible, for instance, with this switch to control four isolated circuits by pairs, eliminating the use of relays and other isolating means from the circuit. Two contacts are provided on both the normally open and normally closed sides.

How Needle Bearings Meet Modern Design Trends



DEMANDS FOR HIGHER SPEEDS, LIGHTER WEIGHT, SIMPLER DESIGN, LONGER BEARING LIFE ALL MET BY ANTI-FRICTION TORRINGTON NEEDLE BEARINGS

•

The advantages of Torrington Needle Bearings in contributing to increased performance and operating efficiency of wartime equipment and materiel have demonstrated the opportunities they offer for design improvement in many peacetime products.

Speeds over 50,000 r.p.m.

One direction where Needle Bearings are being utilized with excellent results is in higher speed applications. Needle Bearings have operated experimentally at speeds as high as 60,000 r.p.m.In one aircraft application the regular DC Type Needle Bearing is operating at a speed of 20,000 r.p.m. In another rotating application utilizing seven DC Needle Bearings, operating speeds range from 7,000 to 14,000 r.p.m. under moderate to heavy load conditions.

Aid in Trend to Lighter Weight

Designs requiring weight reduction are frequently made possible through the use of Needle Bearings. The lighter weight of Needle Bearings themselves and the simplification of designs made possible by their compact size and high capacity both contribute to weight-saving designs.

And Longer Bearing Life

How Needle Bearings are contributing to increased efficiency and longer life is well illustrated in an application of two precision DC Type to the wrist pin end of the connecting rod in a portable gasoline engine. Designed for long periods of operation without servicing, it was found that anti-friction Needle Bearings doubled the service life. The basic design of all Needle Bearings aids in providing efficient lubrication, which is an important contributing factor in service life and in freedom from maintenance and repair.

Our engineering department will be glad to work with you in utilizing to the full all the advantages of Needle Bearings to your own design requirements and in recommending the type and size for any specific application. If you do not already have the Torrington Needle Bearing Catalog in your engineering files, send for your copy. It contains a wealth of data on these modern anti-friction bearings for modern design needs.

THE TORRINGTON COMPANY
Established 1866 • Torrington, Conn. • South Bend 21, Ind.
"Makers of Needle Bearings and Needle Bearing Rollers"
New York Boston Philadelphia
Detroit Cleveland Seattle
San Francisco Chicago Los Angeles
Toronto London, England

TORRINGTON
NEEDLE BEARINGS

Automatic Aircraft Relay Signals Current Interruption

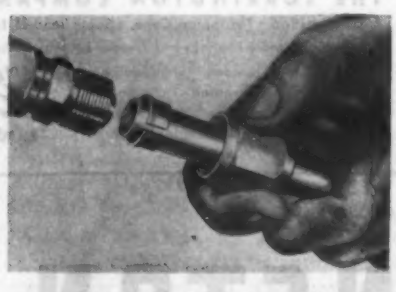
Automatic Electric Co., 1033 W. Van Buren St., Chicago, Ill., has designed a 115 v., 400 cycle, Type 20 aircraft relay specially to meet Army Air Force specifications, including high-voltage coil insulation and protection against failure under conditions of high humidity, temperature variations and shock. The relay is non-positional and operates consistently under extreme vibrations such as is encountered on modern aircraft. The relay is normally operated by the control current and holds its "break" contact springs open as long as the current continues to flow. Interruption of the current releases the relay, which closes the alarm circuit through its contacts.

Stronghold Line of Miniature Machine Screws Is Increased

Manufacturers Screw Products, 216-222 W. Hubbard St., Chicago 10, Ill., has increased the range of sizes of its miniature machine screws. These screws are now available in 0-80, 1-64 and 1-72 thread diameters, both in steel and brass.

Packless Self-Flaring Coupling For Flexible Plastic Tubing

What is described as the first self-flaring coupling for flexible plastic tubing has been announced by Packless Metal Products Corporation, 31 Winthrop Ave., New Rochelle, N. Y. No flaring tools are required. The flare is formed as the members of the coupling are screwed together in one simple operation, assuring uniform



Packless self-flaring coupling

walled flare, with no thinning toward the end to weaken the tube. The plastic tubing is not preheated.

It is stressed by the manufacturers that the construction, by providing a union effect, eliminates twisting and distortion of the tubing in installation, as well as split ends. Only the simplest of shop tools are required and assembly can be made right at the job. Coupling can be reused indefinitely. Couplings are available for tube sizes ¼ to ¾ in. O. D.

U. S. Rubber Coated Glass Cloth Strong and Light

A glass cloth coated with synthetic rubber, manufactured by U. S. Rubber Co., Rockefeller Center, New York, N. Y., features high tensile strength at abnormally high temperatures, extreme lightness and high tear resistance. In addition, it resists fire, gasoline, oil, grease, water, mildew and insects and is not affected by acids or alkalies. Finished weight of double-coated glass cloth is 7.6 oz. per sq. yd. and of single-coated cloth is 5 oz. per sq. yd. It is made in gages from 0.006 to 0.040 and in tensile strengths from 163 to 800 lb. per in.

L. A. Standard Designs Buna Stock for Oil Seals and Ring

Buna N stock 233-5, said to retain tensile strength of over 1,000 lb. per sq. in. and elongation of over 100 percent after subjection to aircraft engine oil at 300 F. for 70 hr., is available from Los Angeles Standard Rubber, Inc., 1500 E. Gage Ave., Los Angeles, Calif. It is designed for oil seals, oil rings and other applications requiring resistance to aromatic fuels. It also remains flexible at —40 F. and has a low compression test.

Quigley Triple-A Paint Resists Heat to 2500 F.

Triple-A High Heat Resisting Paint, manufactured by Quigley Company, 527 Fifth Avenue, New York 17, N. Y., is described as adhering on light steel, under rapid heating and cooling, up to 1400 F., while on alloy steel and brick it will stand 2500 F. or over.

The paint is said to be absolutely non-inflammable, non-irritating and does not give off fume or odors when being applied, upon drying or when subjected to heat or flames.

It is shipped in the proper consistency for application, and for normal interior conditions it is ready for service after application and air drying. For extremely wet interiors it must be heated to 300 F. or over after applying to the surface. It can be sprayed on hot surfaces where a shut-down is inconvenient.

For exterior use it must be heated to 500 F. after it is applied to a metal surface. For continuously hot surfaces no heat treatment of the paint film is necessary either on interior or exterior exposed surfaces. When heat treated, it will resist water, oil, gasoline, benzol, heat and weather.

Cell-Tite Material Strong, Light and Easily Worked

Cell-Tite, an ebony-like cellular rubber material from which propeller fairings are made, is described by its manufacturers, The Sponge Rubber Products Co., 141 Housatonic Ave., Derby, Conn., as having the highest strength ratio of any material ever produced commercially. It is said to have more buoyancy and lower water absorption than cork; to have excellent thermal, electrical and sound insulation qualities and to be strong, hard and of light weight. It can be molded to almost any shape or form, is practically impervious to water and weather and has high resistance to chemical attack. It can be sawed, drilled, planed and otherwise worked much as wood.

Goodrich Company Now Making Rivnut of Brass

Rivnut, the blind fastener said to serve as a nut-plate, rivet or both, is now being made of brass as well as aluminum, it is announced by The B. F. Goodrich Co., Akron, Ohio, developer of the product. Tensile and shear strength of Rivnuts made with the brass alloy are about 50 percent greater than those made from aluminum, says the manufacturer.

Sterling Filling Compound Stands Wide Temperature Range

The Sterling Varnish Co., 105 Ohio River Blvd., Haysville, Pa., has developed a new filling compound, designated as S-182, for lifting magnet cases, potting small transformers and for general filling work. It is described as a firm material with considerable resiliency and great internal cohesion.

S-182 is said to have a high dielectric strength, a low coefficient of expansion and to be water resisting and oil-proof, as well as withstanding temperatures up to 200 C. without resoftening and temperatures as low as —60 C. without becoming brittle.

For the First Time...

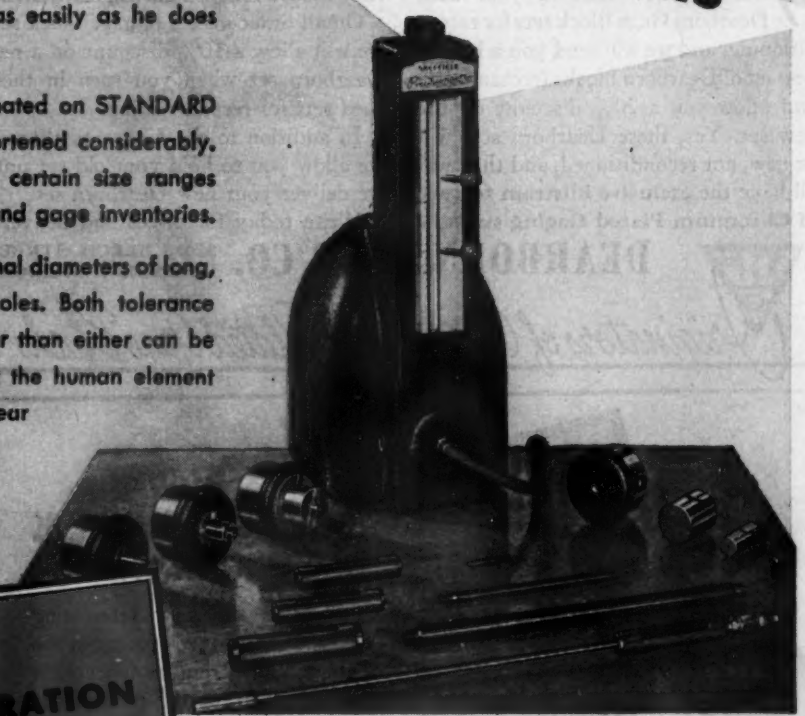
WRITE YOUR OWN SPECS!

STANDARDIZED AIR GAGE SPINDLES AND COMPONENTS

Sheffield Precisionaire spindles, adapters, etc., within certain limits, have now been STANDARDIZED so that any user can make up his own specifications almost as easily as he does for AGD plug gages.

Engineering time and charges are eliminated on STANDARD spindles and components. Delivery is shortened considerably. Components are interchangeable within certain size ranges which means minimum initial purchases and gage inventories.

The STANDARD Precisionaire checks internal diameters of long, short, through, blind or counterbored holes. Both tolerance limits are checked in one operation faster than either can be checked with a plug gage—and without the human element of error. Precisionaire spindles will outwear plug gages 10 to 40 or more times.



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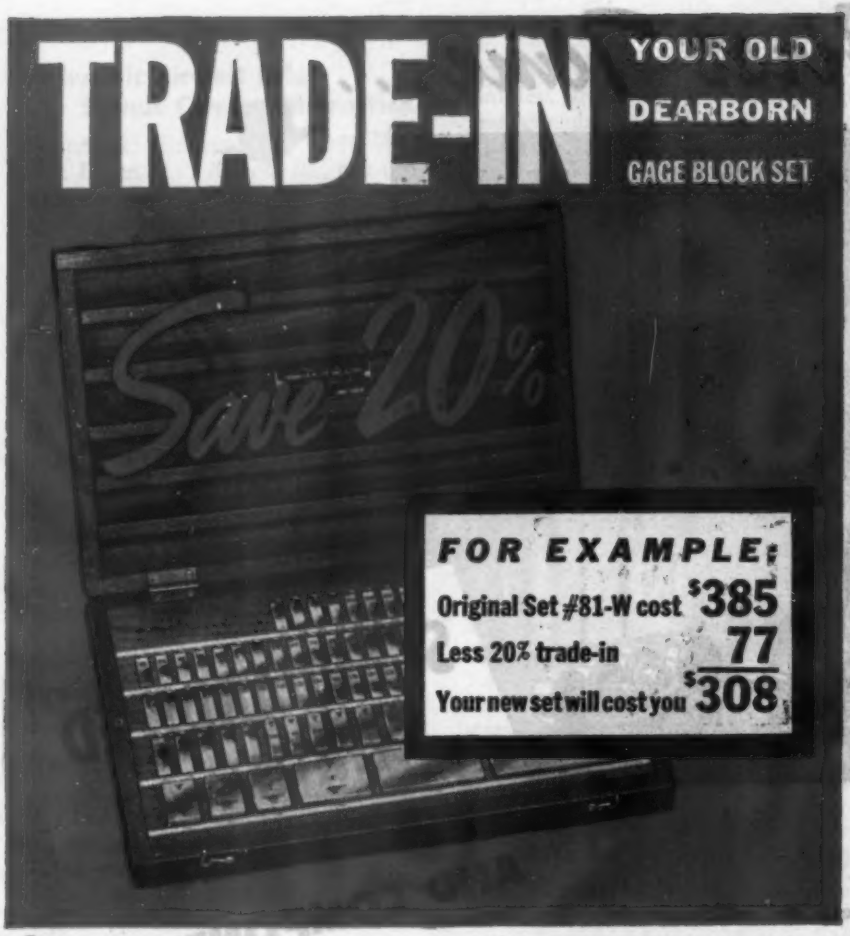
Write for Engineering Data No. 12 on Sheffield STANDARDIZED Precisionaire Components and SPECIAL applications.

TRADE-IN

YOUR OLD DEARBORN GAGE BLOCK SET



YOU can now turn in your used Dearborn Gage Block sets for reconditioning, and we will send you a brand-new set of Dearborn blocks (rectangular) and allow you a 20% discount on the new set. Yes, these Dearborn sets will be new, not reconditioned, and they will all have the **exclusive Ellstrom feature of Chromium Plated Gaging surfaces that insure longer wearing millionths.**

On all other makes of gage block sets we will allow a 10% discount on a new Dearborn set when you turn in these used sets for reconditioning.

In addition to the discounts allowed, we allow you to hold your old set until we deliver your new Dearborn set.

Write today for prices and delivery.

DEARBORN GAGE CO. 22035 BEECH STREET DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks

HOW THE GAGE BLOCK ORIGINATED

Here is the very interesting story of the development of the gage block from its conception in Sweden, at the turn of the century, to the present. It will be sent to you on request. Just write Dearborn Gage Company, Dearborn, Michigan, today for your free copy.

TRADE PUBLICATIONS

ABRASIVES to acquaint grinding wheel users with the newly announced standard markings for identifying grinding wheels and other bonded abrasives, the Carborundum Co., Niagara Falls, N. Y., has prepared a 136-page reference book on grinding entitled "Grinding Facts." The book includes information on the marking symbols, a comprehensive schedule of grading recommendations for general, toolroom, diamond wheel and thread grinding, a description of each common type of grinding, safety rules, and a table of useful speeds. Requests must be made on company letterhead.

CONTRACT SERVICE The Sheffield Corp., Dayton 1, Ohio, has prepared Booklet CS-144 on its contract service division. This service is offered to manufacturing plants engaged in the problems of tooling for new or improved products. It includes the design and manufacture of tools, dies, jigs and fixtures, special purpose machine tools, and the precision manufacture of threaded and formed ground components as well as sub and complete assemblies.

DRILL PRESS ATTACHMENTS "Madco's Drill Press Turret Attachment" is the title of a circular released by the Machine Development Co. of 516 Fifth Ave., New York, N. Y. The bulletin describes how the Madco turret head converts a single spindle drill press for multiple spindle production work, enabling six consecutive drilling operations such as spot-facing, drilling, counter-boring, reaming, to be performed without having to change tools. A description of the Madco turret head, engineering data, an outline of available accessories, and installation and operating instructions are included.

FORGING How hot working improves quality of metal is described and illustrated in a 40-page booklet prepared by the technical committee of the Drop Forging Assn., 695 Hanna Bldg., Cleveland, Ohio. It is intended for users of forgings, instructors in engineering and metallurgy, designing engineers, metallurgists, and production and management executives in the metal-working industry.

HEAT-TREATING Surface Combustion, Toledo, Ohio, is offering a bulletin on Surface Combusion furnaces and their part in the production line. Illustrated graphically is the application of Surface furnaces in process annealing between cup and four draws and in heat treatment from controlled hardening through oil quench, degreaser to discharge of draw furnace. Included is a full-page chart showing Rockwell hardness obtained at various drawing temperatures.

HEAT-TREATING A heat-treating guide for the heat-treater, tool engineer and toolroom foreman has been prepared by the Carpenter Steel Co., Reading, Pa. At a glance information can be found for each steel on type analysis, forging heat, normalizing heat, annealing treatment, furnace atmosphere and recommended drawing range. In addition this chart also gives for each steel the hardness for various drawing temperatures.

LATHES The South Bend Lathe Works, South Bend 22, Ind., is offering Catalog 100-D covering its complete line of precision lathes. Toolroom lathes, quick change gear lathes, large swing lathes, plain change gear lathes and turret lathes are among the types available in a complete range of sizes. Besides containing full data on the features and operation of the various models, the booklet also includes information on attachments, accessories, electrical equipment and floor space.

MANAGEMENT A catalog illustrating and describing eight basic models in mobile canteens for in-plant feeding may be secured from S. Blickman, Inc., Weehawken, N. J. The models included are of various capacities equipped to serve up to 450 persons and are designed to be equally serviceable in any type of industry, regardless of size or arrangement of plant. Some are practically complete restaurants on wheels while others are intended to be used in connection with employee's cafeterias or lunch rooms, for replenishing supplies.

MATERIALS HANDLING A 56-page catalog has been issued by The Howe Scale Co. of Rutland, Vt., fully illustrating and describing its extensive line of warehouse trucks, trailers, dollies, platform skids, lift jacks, wheels, axles and casters. The catalog lists complete specifications for each product, illustrates many special as well as standard items, and is indexed alphabetically by content and by code number for ready reference. Ask for Catalog P-15.

MEASURING "The Use and Care of Micrometers" is the title of a 24-page illustrated booket published by Sav-Way Industries, Detroit, Mich. This booklet, designed to introduce Sav-Way master setting and checking rolls for micrometers and other precision measuring instruments, discusses the micrometer, explains the functions of various parts, tells how to use it and how to take care of it. Requests should be addressed to Box 117, Harper Station, Detroit 13, Mich.

MILLING The Nichols-Morris Corp., 50 Church St., New York 17, N. Y., has published an 86-page handbook on the Nichols miller. This machine is said to be designed to permit high cutting speeds without unnecessary friction or sacrifice of precision. The features and construction of this mill-

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. . to inspect the home of TURNER gauges

The next time you are in this vicinity we invite you to take a trip through our plant and offices which production experts call ideal for the manufacture of precision equipment. Investigate the well planned working conditions which make the perfection of Turner Gauges possible.

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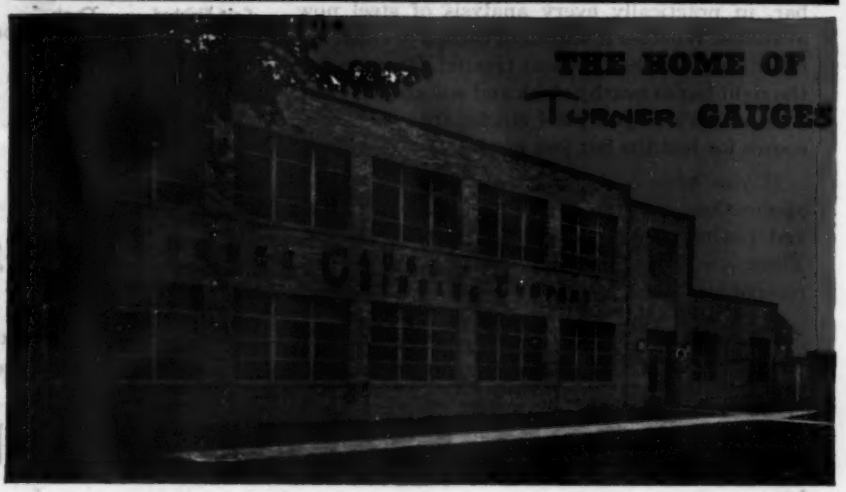

(*Advertisement*)

NEARBY WAREHOUSE STOCKS OFFER WIDE SELECTION OF STEEL PRODUCTS

Over a period of the past several months, the once depleted steel stocks of the nation's warehouses have gradually grown in both tonnages and variety of sizes. Today, the available steel in some instances approaches pre-war levels. The necessity of offering substitute material has become less frequent. Now, for the most part, it is possible to obtain the exact specification needed for each job. Particularly is this true in the matter of Bars, Plates, and Tubing. Joseph T. Ryerson & Son, Inc., the nation's largest steel-service warehouse organization reports largest stocks in years now on hand awaiting your orders. They point out that the right steel not only makes your work easier, saves labor, and produces a better product, but it is also the most economical.

save time and money

use the RIGHT bar

When specifications call for bar steel, phone Ryerson. You'll save time, trouble and money—get the bar exactly right for your job—because Ryerson stocks include practically every shape and size of bar, in practically every analysis of steel now available. Whether it's straight carbon or alloy, hot rolled, cold finished or heat treated, Ryerson has the right bar in nearby stock and will ship at once. The nation's largest steel stocks are your surest source for just the bar you need.

If you have a question of steel selection or application, experienced Ryerson metallurgists and engineers will be glad to work with you. There is no obligation. Inquiries as well as orders receive prompt attention.

Ryerson Bar Stocks Include:

Allegheny Stainless	Hi-Steel
Alloy	Hot Rolled
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Carbon Steel	Octagons
Cold Finished	Ovals
Cold Twisted	Pickled & Oile
Forged	Reinforcing
Forging Quality	Round Edge
Free Cutting	Screw Steel
Galvanized	Shafting
Half Ovals	Spring Steel
Half Rounds	Stressproof Steel
Heat Treated	Threaded
Hexagons	Tool Steel
High Carbon	

Shapes, Plates, Sheets, Tubes and many other steel products are also in stock for quick shipment.

JOSEPH T. RYERSON & SON, INC. Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

RYERSON STEEL-SERVICE

er as well as its many uses and applications are discussed in detail supplemented by many dramatic illustrations.

MILLING AND DUPLICATING The George Gorton Machine Co. of Racine, Wis., is offering a 20-page bulletin No. 1400-C on its super-speed milling machines and a 12-page Bulletin No. 1319-E on its Models 8-D, 8½-D and 9-J die and mold duplicators. Both bulletins are complete with illustrations, applications and specifications.

PLATING A bulletin on Koroseal tank linings by Udylite Corp., 1651 E. Grand Blvd., Detroit 11, Mich., has been released by that company. The many features of Koroseal are discussed and a list of the most commonly used industrial metal finishing chemicals which may be used in Koroseal lined tanks is given. The tables show temperature and concentration limitations within which Koroseal linings have been found to be practical. Also indicated are chemicals which cannot be used in rubber-lined tanks.

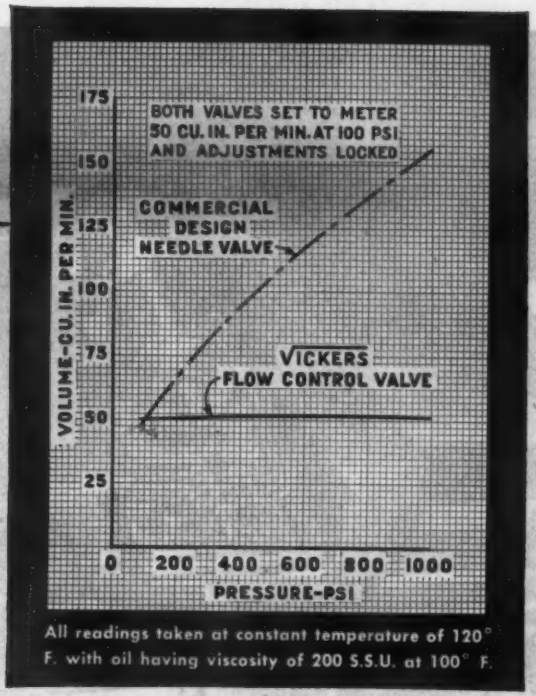
RIVETS Uses of explosive rivets in peacetime production jobs, in addition to application in the aviation industry, are discussed fully in a manual published by E. I. du Pont de Nemours & Co., Explosives Dept., Wilmington 98, Del. Applications covered include automotive, refrigeration, housing, heating, ventilating and air conditioning, radio, shipbuilding and household appliances.

RADIUS DRESSER A four-page insert, for its 60-page tool catalog, describing two new models of radius dressers, is announced by U. S. Tool & Mfg. Co., 6906 Kingsley, Dearborn, Mich. Model 45 is adaptable to all radii up to and including 4½ in. and can be used for concave or convex dressing. Model 124 is an angle correcting radius dresser, maximum radius 1⅛ in., and is designed for correcting radius on a wheel for grinding compound and compound complex forms on flat form tools.

SPRAY NOZZLES Chain Belt Co., Milwaukee, Wis., has produced a folder describing Rex flat spray nozzles, for use in all industries where water is used in cleaning, cooling and washing operations. Besides illustrating and describing the various nozzles, the folder gives tabular information concerning their discharge in gallons per minute, their dimensions, a list of materials, sizes and prices.

SPEED REDUCERS Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill., has announced publication of Book No. 1824, a 100-page data book on worm gear speed reducers for industrial applications. The book is complete with photographs, dimensioned line drawings, engineering data, h.p. ratings and tables of weights and dimensions, all aimed at helping the

CONSTANT FLOW RATE REGARDLESS OF VARIATIONS IN FLUID PRESSURE



All readings taken at constant temperature of 120° F. with oil having viscosity of 200 S.S.U. at 100° F.

VICKERS
FLOW CONTROL AND OVERLOAD RELIEF VALVES

In hydraulic control systems, this valve combines the functions of a flow control valve with an automatic relief valve to save space and simplify installation. It maintains a constant "metering-in" flow rate (for a given setting of the control adjustment) regardless of any variation in imposed fluid pressure resulting from changes in work resistance. Pump operates only at pressure required to do the work at hand; relief valve is independently adjustable and limits the maximum system pressure to any desired value.

This valve combines in one unit the means for accomplishing three independent functions: (1) adjustable control of flow rate in the hydraulic circuit, (2) adjustable overload pressure protection in the hydraulic system, and (3) remote "Start and Stop" control when used with suitable pilot valve. See Bulletin 40-22 for complete information. Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

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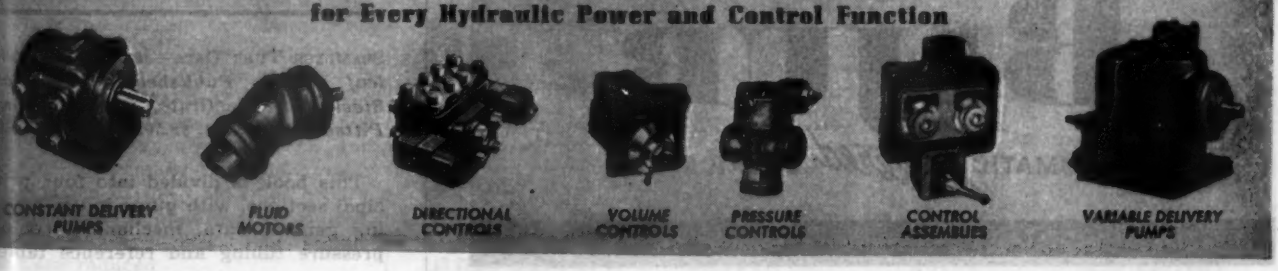

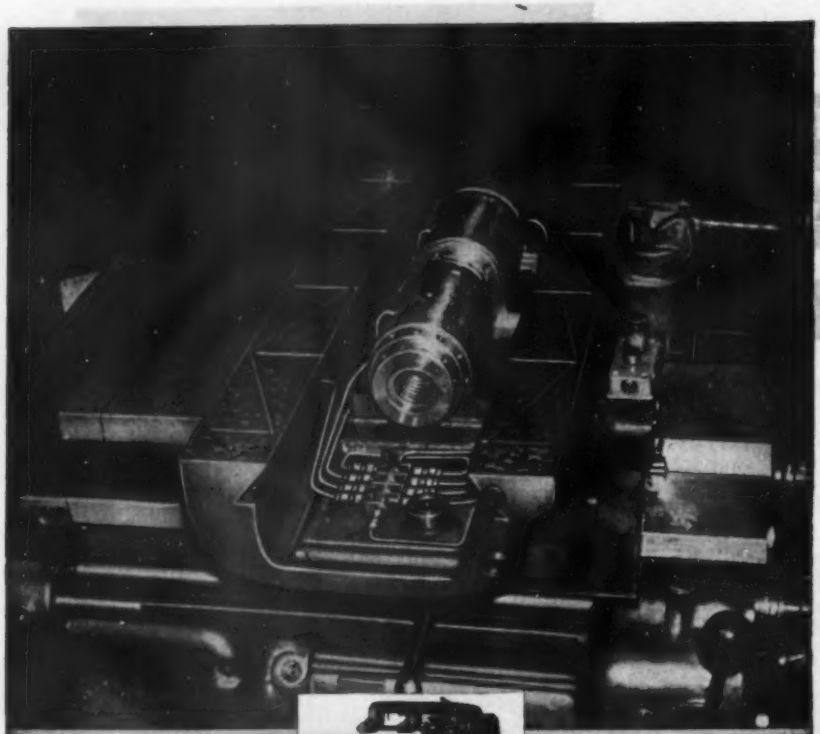

"VAN NORMAN" Milling Machine ... Bijur-Lubricated

protection BUILT-IN...

● Examine any improved new machine, devised to reduce the over-all completion time of work in progress—and the chances are you will find it automatically lubricated. BIJUR built-in lubrication means built-in protection . . . for maintained high speeds, uninterrupted long runs, unimpaired machine efficiency.

Cuts maintenance costs, too!

Bijur Lubricating Corporation, Long Island City, N. Y.

BIJUR

AUTOMATIC Metered LUBRICATION

1614

reader of the book to select the proper type and size of reducer for a specific service.

STEEL TUBING The Globe Steel Tubes Co., Milwaukee, Wis., has completed a technical Bulletin No. 112 entitled "Bursting Pressures of Seamless Steel Tubing" prepared especially to serve as a reference chart for engineers. The tables cover bursting pressures from ⅛ in. to 9¾ in. O. D.

TAPPING A manual for use in machine shops and other industrial plants where taps are used in production or maintenance work may be secured from Charles H. Besly & Co., 118 N. Clinton St., Chicago 6, Ill. The book contains notes on the proper selection of taps for various types of work and provides complete tables covering tap fits, basic thread dimensions, and tap drill sizes. Recommended tapping speeds, lubricants, and angle of cutting face for various metals are also included. Other sections give information on special taps, tap usage, and tap sharpening.

WELDING ELECTRODES Alloy Rods Co., York, Pa., has released a booklet on arc welding electrodes. General instructions are given for tool steel welding electrodes of various types, including high speed, hot work, air hardening, work hardening, oil hardening and water hardening types. Other information in the book includes a classification of tool steels by types.

WELDING ELECTRODES A 40-page tool steel welding manual and catalog has been prepared by the Welding Equipment & Supply Co., 223 Leib St., Detroit 7, Ill. The data contained in this publication comprises complete information on metallic arc tool steel welding. A table of electrodes with their recommended uses and characteristics of the weld deposits secured is given.

WELDING POSITIONERS Bulletin No. 2153, presenting the full line of Ransome welding and assembly positioning equipment, has been released by Ransome Machinery Co., Dunellen, N. J. Photos, diagrams, specifications and important features of the positioners as well as load rating tables are included in this four-page bulletin.

NEW BOOKS

SEAMLESS TUBE DATA—*320 pages, looseleaf binder. Published by Seamless Steel Tube Institute, Gulf Building, Pittsburgh 19, Pa. $2.50.*

This book is divided into four principal sections, with guide index, covering general data, mechanical tubing, pressure tubing and reference tables.

The section of general data presents a brief summary of the history, manufacture, tests, special shapes and standard steels with chemical composition and mill practices.

A section on mechanical tubing gives information on typical uses, suggestions of how to obtain best results through the use of tubing, determining proper size, tolerance tables, properties for beams and a digest of standard specifications.

The section on pressure tubing covers various pressure formulae, specifications and tolerance tables for boiler tubes, heat exchanger and condenser tubing, still tubes, alloy steel pipes, stainless steel analyses with metallurgical data.

The reference table section has formulas, weight tables for rounds, squares, rectangles, surface areas both inside and outside and other tables commonly found useful in tubing applications.

Supplementary sheets with new data will be supplied from time to time.

BIBLIOGRAPHY OF INDUSTRIAL ENGINEERING AND MANAGEMENT LITERATURE—*By Ralph M. Barnes, professor of industrial engineering and director of personnel, University of Iowa, and Norma A. Englert, librarian of engineering library, University of Iowa. 80 pages. Published by The State University of Iowa, College of Engineering, Iowa City, Iowa. $1.50.*

This book has been prepared for the use of industrial engineering and management students. While originally prepared to aid in arranging special courses of study for advanced students, it was later expanded for use in special courses.

It is divided into four sections: books and bulletins, articles and papers, abbreviations of titles of magazines and papers used in bibliography and index of articles.

Material to Jan. 1, 1943 is included.

Spot Welding Under Water

IN MAKING FILAMENT ASSEMBLIES for power tubes, Federal Telephone & Radio Corporation has developed a stunt in spot welding that avoids a cleaning operation. A copper mandrel is placed in a lathe, and support strips for the tantulum-wire filament are placed in lengthwise slots in the mandrel. Then the filament is wound. After this, the mandrel is transferred to a seam welder, and is submerged vertically in water. The seam welder rolls spot weld the filament to the support members, and since the operation is done under water no oxidation of the tiny welds occurs. Thus, no cleaning operation is required, and the chances of disturbing the filament are reduced.

DESIGNED to deliver the GOODS

STANDARD CONVEYOR COMPANY is able, through long experience, to specify and build for a diversity of handling needs . . .

A procession of products, of the widest imaginable variety, is pouring off assembly lines today—on time, or ahead of schedule — because Standard Conveyors are helping to channel the flow of production. Whether the rate of manufacture is several hundreds a minute or one an hour, Standard builds the right type of conveying equipment to meet the situation.

The range and versatility of Standard Conveyor equipment is the result of nearly 40 years of close contact with inside-the-plant transportation — in plants large and small, making products as widely diverse as steel or cosmetics. Check with Standard Conveyor for the right kind of conveying equipment to "deliver the goods" faster — at lower cost — now or for postwar production.

Write for comprehensive reference book — "Conveyors by Standard" — Catalog No. AM-114.

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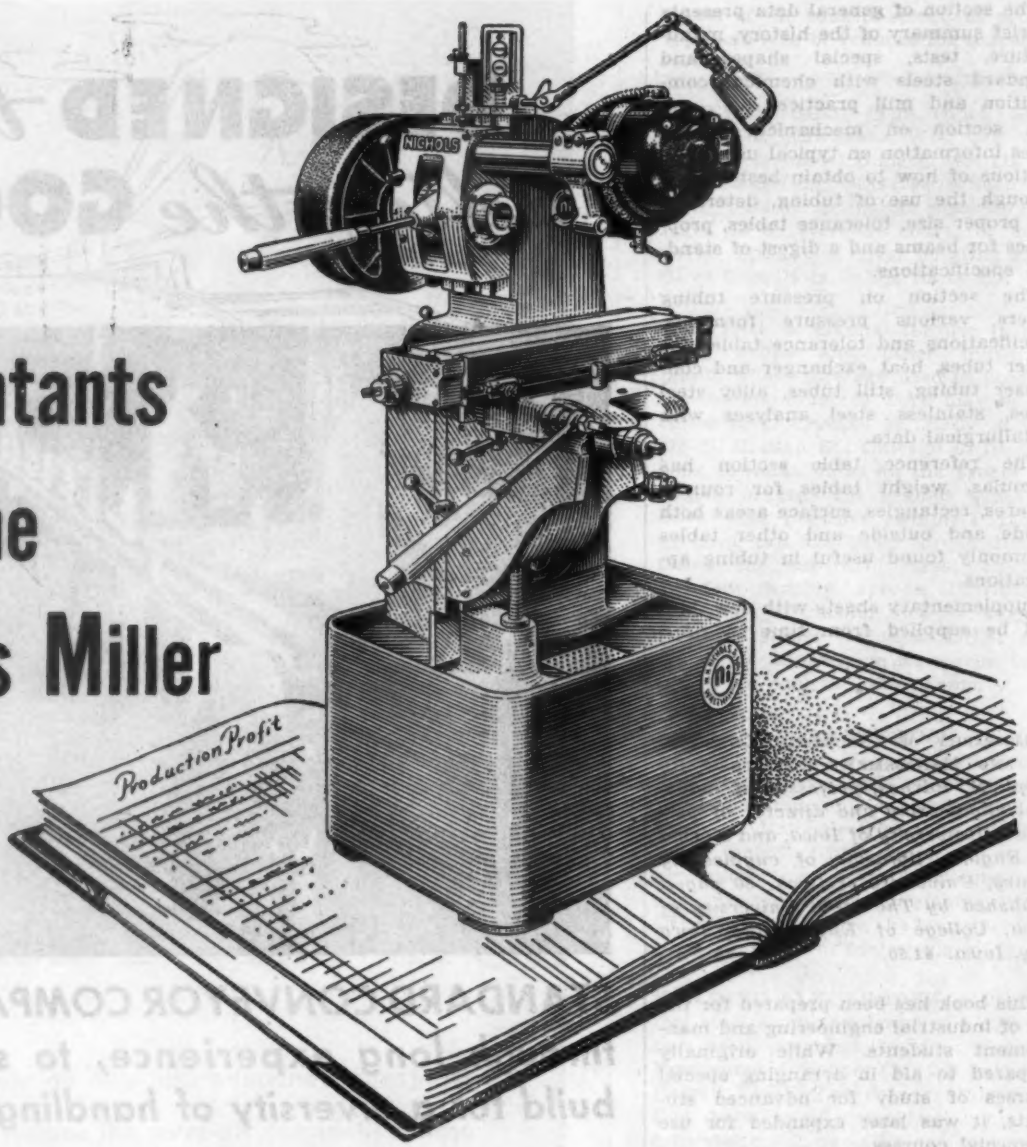
TIERING AND LIFTING MACHINES | PORTABLE PILERS | SPIRAL CHUTES | PNEUMATIC TUBE SYSTEMS

Why Accountants Like the Nichols Miller



He may not know a milling machine from a centerless grinder. But your accountant, because he keeps a watchful eye on the profit side of your production ledger, can appreciate the advantages of a machine that *quickly pays for itself*... the Nichols Miller.

Extra-utility is basic in the Nichols Miller's design. Starting with the fundamental principle of bringing the cutter on a sliding head down to the work, W. H. Nichols & Sons has engineered around it a machine tool that maintains *toolroom tolerances* in high-speed production, yet is sturdy enough to take on heavy duty jobs as well.

Simple, inexpensive fixtures and quick set-up keep Nichols Millers humming even in semi-skilled hands, through an extensive range of milling, boring, turning and facing operations. And it's not unusual to see it doing the work of expensive precision boring machines, lathes and grinders... more economically.

Lathe carriage flexibility is an added production feature made possible by the Lever-Rack and Pinion Transverse feed, an exclusive Nichols development. Work can be chucked lathe-fashion on the spindle with tools mounted on table or vice-versa.

Equally at home in toolroom, laboratory or on the production line, the Nichols Miller is a profitable "operator." And you'll be surprised at its low initial and maintenance costs.

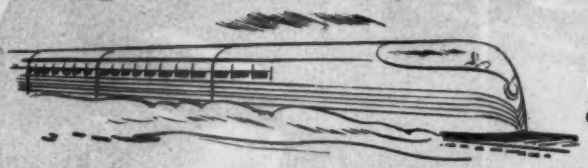
Our new photographic brochure will show you some of the many ways it can work for you. A post card will bring it to you promptly.

THE NICHOLS MILLER

"THE MILLER THAT USES ITS HEAD" • MANUFACTURED BY W. H. NICHOLS & SONS, WALTHAM, MASS.

NATIONAL DISTRIBUTORS: NICHOLS-MORRIS CORP., 40 Church St., New York 7, N.Y. *Dealers in all principal cities*

NO "DOCTORED-UP" VERSION OF AN OLD IDEA . . IT'S A



20TH CENTURY DESIGN THAT TOOK YEARS OF RESEARCH

AND TESTING TO DEVELOP!

IT'S PHILLIPS → THE ENGINEERED RECESS

In ease and speed of driving, there is nothing quite like the Phillips Recessed Head Screw.

That's because the Phillips Recess was developed from scratch–not just adapted from some older, less satisfactory type of recess. It's an *engineered* recess . . . with years of costly testing and research behind each design feature.

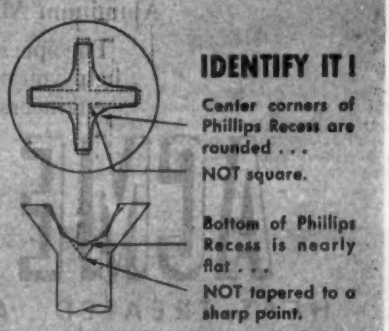
As a result, every angle, every flat plane, every dimension of the Phillips Recess makes a definite contribution to easier, faster, more efficient screw driving.

The recess walls are angled just right to eliminate fumbling starts, to let workers utilize their *full* turning power. The 16 flat planes are provided to hold even worn drivers snugly. And the depth of the recess is exactly figured to give unusual strength to Phillips Screw Heads, and make it easy to keep Phillips Bits and Drivers lined up with the axis of the screw.

To Make Wartime Quotas and Peacetime Profits . . . get the faster starting – faster driving–stronger, better-looking fastenings that only screws with Phillips Recessed Heads can give you! All over the country, manufacturers are switching to Phillips Recessed Head Screws to speed up assembly and cut costs. Give your assembly department "a shot in the arm" – change to Phillips Screws, too. Available in all head styles, types, and sizes!

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS


IDENTIFY IT!
Center corners of Phillips Recess are rounded . . .
NOT square.
Bottom of Phillips Recess is nearly flat . . .
NOT tapered to a sharp point.

24 SOURCES

American Screw Co., Providence, R. I.
Atlantic Screw Works, Hartford, Conn.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
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International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoli Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
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Assures Easier Machining and Better Performance of Acme Aluminum Castings

The aluminum alloy castings that come to you from the Acme foundry are tested castings—put through every form of inspection and examination known to modern metallurgical technique.

X-ray inspection gives a clear and accurate picture of the casting's internal structure. To measure strength, bars from every melt are pulled to the breaking point on a tensile machine. And the completion of our spectographic laboratory has put at our disposal—and yours—the newest advancements in the scientific analysis of alloy metals.

Because of their accuracy and inherent quality, assured by our quality control, you will find Acme Castings require less machining time, reduce your cost per finished part. Your customers will get better performance from parts made from Acme Aluminum Alloy Castings.

The special advantages of Acme Castings should help you speed production and reduce costs. Acme engineers will be glad to submit recommendations.

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PATTERNS · TOOLS · TOOL DESIGNING · PRODUCTION PROCESSING

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DEADLY broods of rocket projectiles nestling under their wings add enormously to the destructive firepower of fighter planes in attacks on ground objectives.

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Texaco Cutting Oils lubricate the tools, carry away heat and prevent chip welding, thus lengthening tool life, assuring greater output.

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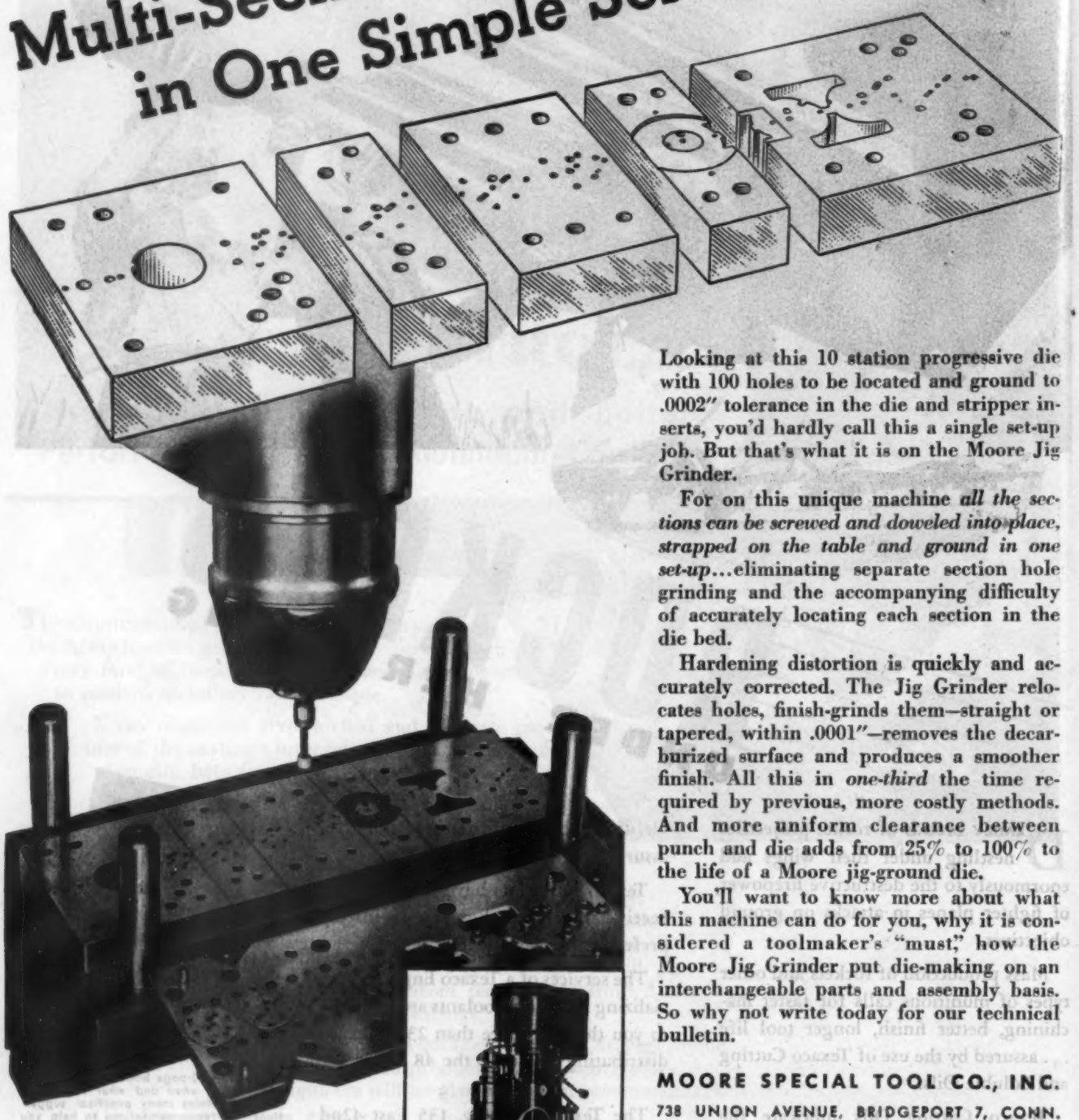
TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT — CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Multi-Section Hole Grinding in One Simple Set-up



Looking at this 10 station progressive die with 100 holes to be located and ground to .0002" tolerance in the die and stripper inserts, you'd hardly call this a single set-up job. But that's what it is on the Moore Jig Grinder.

For on this unique machine *all the sections can be screwed and doweled into place, strapped on the table and ground in one set-up*...eliminating separate section hole grinding and the accompanying difficulty of accurately locating each section in the die bed.

Hardening distortion is quickly and accurately corrected. The Jig Grinder relocates holes, finish-grinds them—straight or tapered, within .0001"—removes the decarburized surface and produces a smoother finish. All this in *one-third* the time required by previous, more costly methods. And more uniform clearance between punch and die adds from 25% to 100% to the life of a Moore jig-ground die.

You'll want to know more about what this machine can do for you, why it is considered a toolmaker's "must," how the Moore Jig Grinder put die-making on an interchangeable parts and assembly basis. So why not write today for our technical bulletin.

MOORE SPECIAL TOOL CO., INC.

738 UNION AVENUE, BRIDGEPORT 7, CONN.

MOORE TOOLS

MOORE Jig Grinder

THE ONLY MACHINE OF ITS KIND

What McCASKEY Control will do for you . .

Experiences in hundreds of plants, large and small, employing from a few to many thousands, prove that McCaskey Tool Crib Control . . .

1 Reduces crib inventories

2 Eliminates loss and theft of tools

3 Reduces breakage to an absolute minimum

4 Quickly locates all tools whether in the crib or in possession of workmen

5 Speeds crib service, reducing non-productive waiting time of workers and machines

6 Reduces tool clearance time of departing employees to a fraction of a minute

7 Definitely records employees' responsibility for tools, preventing disputes when tools are returned or workers quit

8 Is operated with minimum crib personnel; inexperienced attendants of either sex trained in about one shift

9 Is easily installed in busiest cribs and plants; initial investment and operating expense quickly repaid

10 Provides for inspection and, when necessary, reconditioning of used tools before replaced in bins

11 Shows how long workmen retain tools; prevents keeping more than necessary at any time

12 Provides perpetual inventory and record of tool activity for elimination of obsolete tools and reduction of excessive inventories

13 Gives you facts justifying or denying necessity for tool purchases

14 Provides reliable data on life and comparative performance of brands and types of tools

15 Gives you accurate basis for allocation of tool expense to various departments

How TOOL CRIB CONTROL actually pays for itself . . . in a day or two

A well known plant recently dropped several hundred employees in a few days. One department with McCaskey Control in its tool cribs checked-out its employees with practically no loss of tools.

Another that was operating with the conventional check system lost several hundred tools. The management knew it, but could do nothing about it. McCaskey Control would have cost less than the tools that were lost.

This is only one of many reasons why McCaskey pays its way, but it is particularly important today.

Sooner or later during the next few months, thousands of plants must call in their tools and check out many of their employees . . . some temporarily, some permanently.

There will be no disputes about responsibility for tools in McCaskey controlled cribs and the tools will be returned. The losses in most others will greatly exceed the price of McCaskey installations.

Adopt McCaskey Control now. Improve your tool service, save tools and productive time now, and simplify reconversion to peacetime requirements later on.

●

Let us have a representative explain how McCaskey Tool Control can be installed in the busiest cribs without disturbing production in the least—or send you factual reports on McCaskey savings in several well known plants.

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THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Ontario, Canada — *The McCaskey Register Co., Watford, England*

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL

COLD FINISHED 45+ CARBON OPEN HEARTH

SPEED TREAT STEEL

Perfect results from

FLAME or INDUCTION HARDENING *plus* FAST MACHINING

FLAME or INDUCTION HARDENING

of SPEED TREAT STEEL results in hardness of 60 to 62Rc. with water quench and 56 to 58Rc. with oil quench.

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SPEED TREAT STEEL machines consistently at 170 S.F.P.M. with excellent tool life and fine finish. Plants report production increases of 35 to 55% — scrap loss reductions of 50 to 75% — doubled tool life and actual dollar savings running as high as $69 per ton of steel used.

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Our Metallurgists Are At Your Service.

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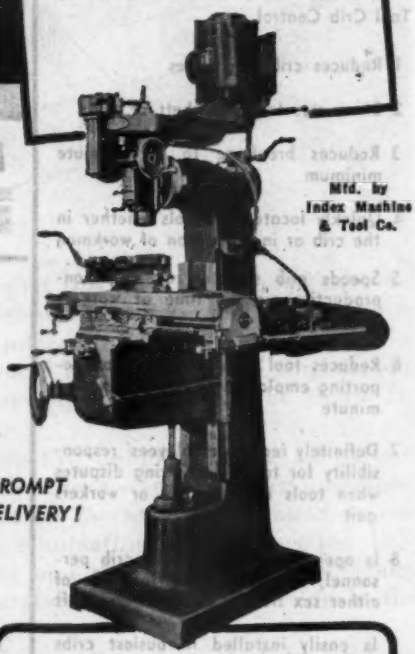
MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

INDEX VERTICAL MILLS FOR THE TOOL ROOM OR PRODUCTION LINE

Milling, Drilling or Boring. Verniers or Rods and Indicators for locating. Ask the shop that has one. Better still, ask the shop that has an Index and also another of competitive make.



Mfd. by Index Machine & Tool Co.

PROMPT DELIVERY!

12" Tool Room Rotary Table

Mfd. by Index Machine & Tool Co.

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

For use on Index Mills or any other machine that will accommodate a 12" table.

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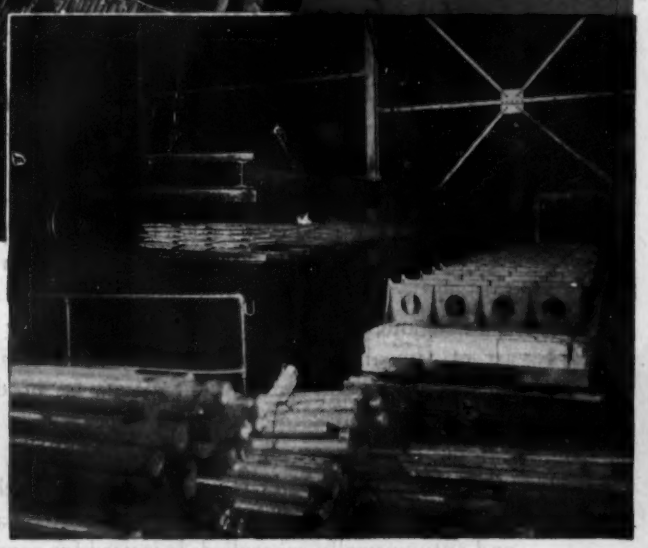
WYCKOFF

special furnace treated steel



the answer

TO MANY OF YOUR POST-WAR COLD FINISHED CARBON AND ALLOY REQUIREMENTS

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ARMY E NAVY

WYCKOFF

General Offices: **PITTSBURGH 30, PENNA.**

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Manufacturers of Carbon and Alloy Steels . . . Turned and Polished Shafting . . . Turned and Ground Shafting . . . Wide Flats up to 12" x 2".

COMPLETE ANNEALING AND HEAT TREATING FACILITIES

New and special heat-treating equipment now available at Pittsburgh...*has capacity to handle 25,000 tons of rolled alloy steel products annually*

THIS NEW HEAT-TREATING equipment places at the disposal of alloy steel users in the Eastern area the latest and most advanced mechanical and metallurgical developments in the fine art of annealing and heat treatment. It supplements the 158,400-ton annual capacity for producing electric furnace steel now in operation at our Duquesne Works, near Pittsburgh.

High, uniform quality is insured by a novel, 7-chamber, continuous furnace electrically heated and automatically controlled. It is used for production line service in heat treating bars which require quenching and drawing operations, normalizing or annealing, including special types of anneals such as sub-critical or by isothermal transformation.

So arranged that it may be operated in a continuous 366-ft. hardening and tempering line, this furnace will handle a *single layer* of 25-ft. bars, from ⅜ in. to 8¼ in. diameter, as well as flats or squares.

This method of single layer heat treatment of bars has definite advantages. Bars will be more uniformly heated, less scale is formed, overheating is avoided. Greater flexibility and closer control are also assured whenever a particular or special type of heat treatment is necessary.

For spheroidize annealing and for annealing operations requiring long controlled, slow-cooling cycles, three 25-ft. and two 36-ft. gas-fired car bottom furnaces are further available. Oil and water quench tanks are available for heat treating bars from these furnaces. The necessary auxiliary equipment is of the latest, most improved type.

Designed to insure superior physical properties in the heat-treated product, this equipment provides the flexibility to handle small orders as well as full heats when necessary.

USS

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

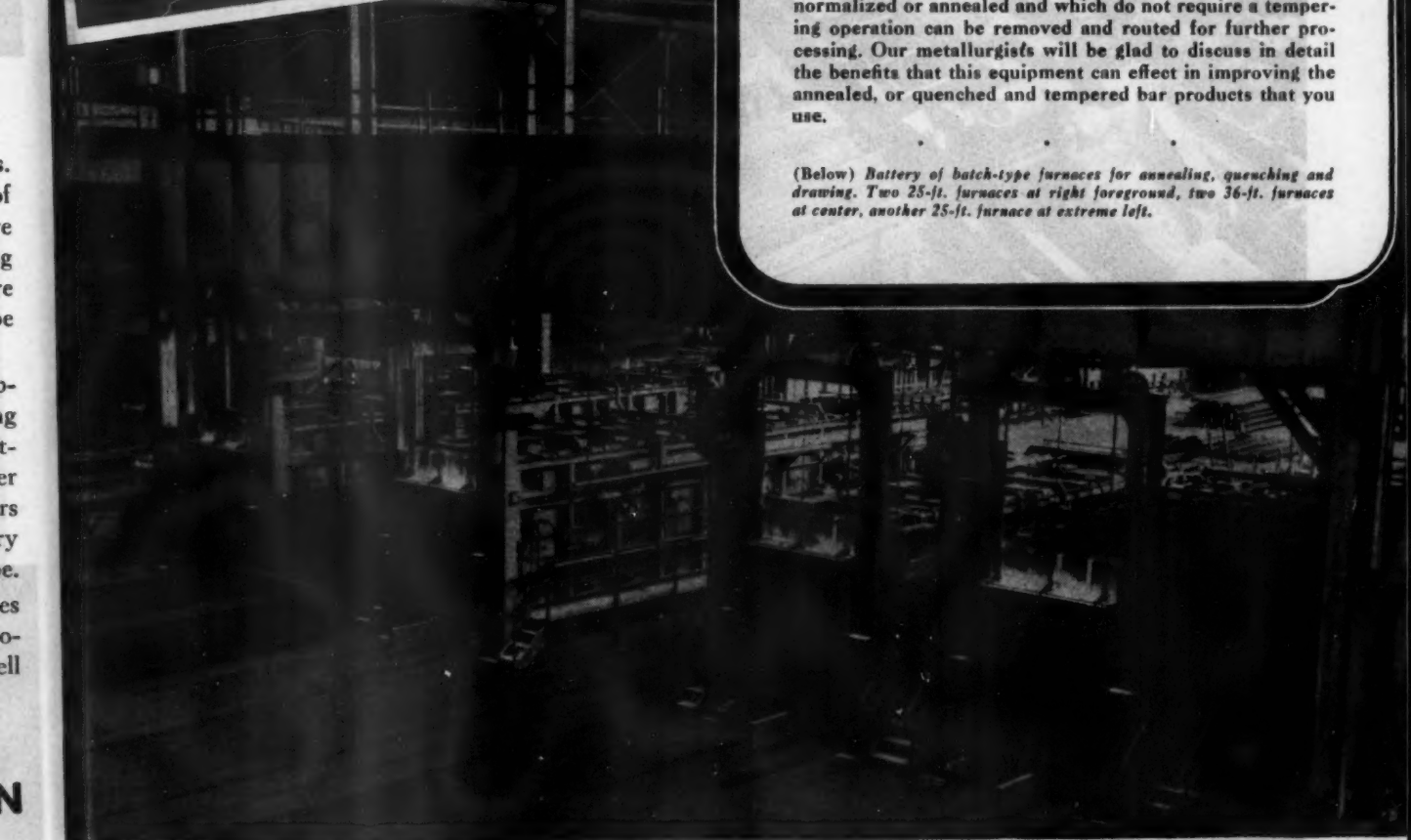
Novel straight-line, 7-chamber Continuous Heat-treating Furnace assures high and uniform quality

In sequence of operation, the line consists of (1) a heating section divided into preheating, intermediate, and high temperature chambers, each with separate doors; (2) a quenching tank for either oil or water quenching under automatic cycle control; (3) a strain-relief furnace; (4) center discharge and cross-feed transfer table, and (5) a tempering section. This last section, like the heating section, is also divided into three chambers, each with separate doors.

Extreme flexibility is obtained in the unit by the discharge table and cross-feed conveyor located between the strain-relief and tempering section. At this table, bars that are normalized or annealed and which do not require a tempering operation can be removed and routed for further processing. Our metallurgists will be glad to discuss in detail the benefits that this equipment can effect in improving the annealed, or quenched and tempered bar products that you use.

• • •

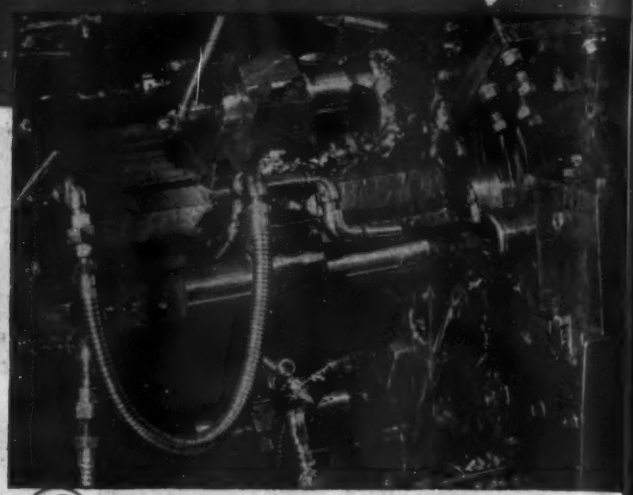
(Below) *Battery of batch-type furnaces for annealing, quenching and drawing. Two 25-ft. furnaces at right foreground, two 36-ft. furnaces at center, another 25-ft. furnace at extreme left.*



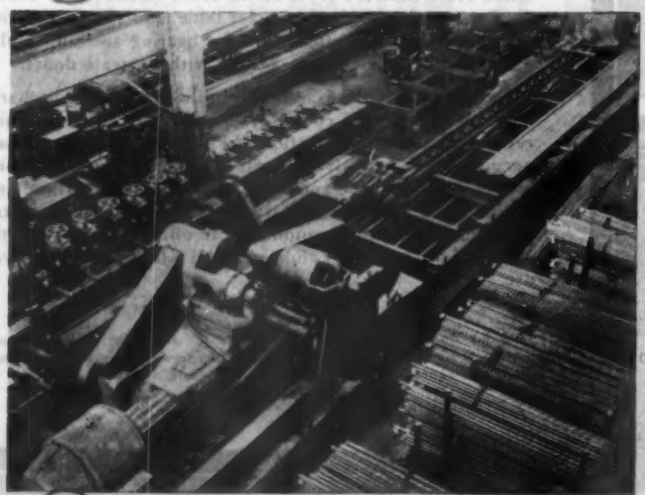
UNITED STATES STEEL

4 Reasons Why

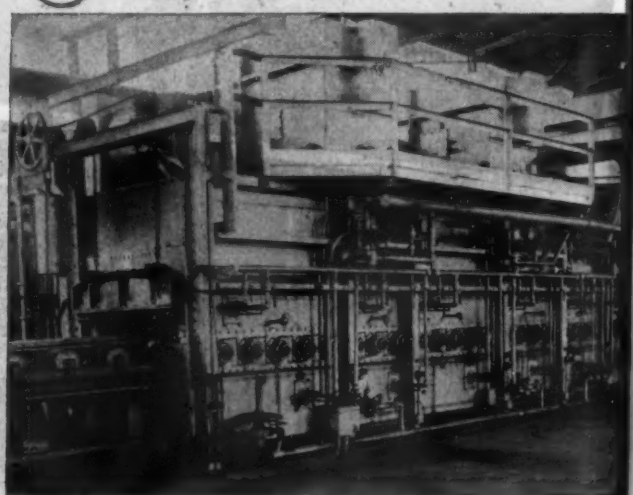
1 NEW METALLURGICAL LABORATORIES



2 RENEWED MACHINING RESEARCH



3 INCREASED PLANT FACILITIES



4 COMPLETE HEAT-TREATING EQUIPMENT

Republic

REPUBLIC STEEL — PRODUCTION FOR VICTORY

US

UNION COLD DRAWN STEELS

Free-Machining Bessemer, Open-Hearth and Electric Furnace Steels

Union Cold Drawn Special Sections

Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting)

UNION DRAWN CAN DO MORE FOR YOU THAN EVER BEFORE!

• What would you like in the cold finished steels you use—better machinability, physical properties, soundness, accuracy, finish, heat treatment, or less tool wear? Do you want higher production efficiency—greater output of perfect steel parts at lower cost per piece?

Here are four developments at Republic's Union Drawn Steel Division which will help you achieve those objectives:

1. NEW METALLURGICAL LABORATORIES. New physical and chemical equipment at all plants provides better and more extensive facilities for continued research into the intricacies of cold drawn steels, and for the vigilant laboratory control over product quality for which Union Drawn always has been noted.

2. RENEWED MACHINING RESEARCH. Before the war, tons of steel were cut up into test parts to study the machinability of various cold drawn analyses under actual shop conditions. This research has been resumed on the most modern equipment to further add to Union Drawn's half century of machining experience—unequalled by any other producer

3. INCREASED PLANT FACILITIES. The capacity of every Union Drawn plant has been stepped up through the addition of new equipment of all types—to provide you with the finest quality cold finished steels in the quantities you need when you need them.

4. COMPLETE HEAT-TREATING EQUIPMENT. The advantages of heat-treating cold drawn steels to increase physical properties, hardness and machinability has been well demonstrated during the war. Modern furnace equipment of all types installed in plants at Massillon, Gary, Beaver Falls and Hartford now enable Union Drawn to supply your every need in furnace-treated cold drawn steel—annealed, normalized, spheriodized, stress relieved and otherwise heat treated.

Yes, Republic Union Drawn Steel Division is now prepared to do more for you than ever before—in providing you with the right steel bar or shafting to do each specific job most efficiently and economically—in helping you through metallurgical and engineering assistance to get the best results from the steel.

Republic metallurgists and engineers are ready to discuss your particular problems—and to offer advice on steel analyses, set-ups, feeds, speeds and heat treatment methods. They've helped other steel parts producers—they can help you.

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • Massillon, Ohio
GENERAL OFFICES • • CLEVELAND 1, OHIO
Berger Manufacturing Division • Culvert Division
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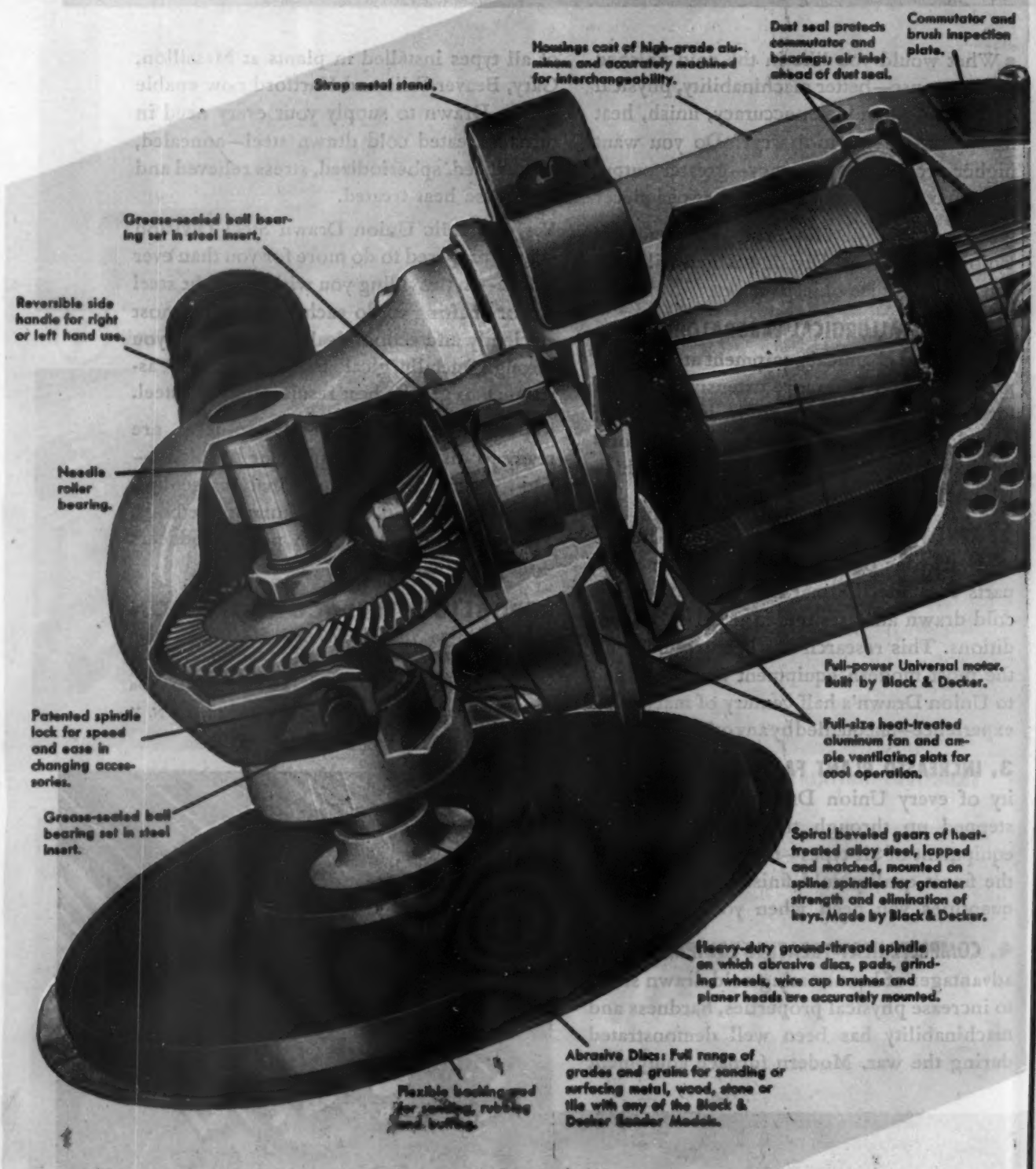
Engineered for peak


Dust seal protects commutator and bearings; air inlet ahead of dust seal.
Commutator and brush inspection plate.
Housings cast of high-grade aluminum and accurately machined for interchangeability.
Strap metal stand.
Grease-sealed ball bearing set in steel insert.
Reversible side handle for right or left hand use.
Needle roller bearing.
Full-power Universal motor. Built by Black & Decker.
Full-size heat-treated aluminum fan and ample ventilating slots for cool operation.
Patented spindle lock for speed and ease in changing accessories.
Grease-sealed ball bearing set in steel insert.
Spiral beveled gears of heat-treated alloy steel, lapped and matched, mounted on spline spindles for greater strength and elimination of keys. Made by Black & Decker.
Heavy-duty ground-thread spindle on which abrasive discs, pads, grinding wheels, wire cup brushes and planer heads are accurately mounted.
Abrasive Discs: Full range of grades and grains for sanding or surfacing metal, wood, stone or tile with any of the Black & Decker Sander Models.
Flexible backing pad for sanding, rubbing and buffing.

Sanders—performance

Guard protects plunger from accidental contact.
Cable clamp and cord protector prevent strain and kinking.
Shaped handle for better balance and ease of operation.
Two-pole heavy-duty enclosed switch; sealed against abrasive dust.
Grease-sealed ball bearing set in steel insert.
Cartridge-type brush holder; brushes accessible for inspection.

7" Special Ball-Bearing Sander
Illustrated, $53
also
7" Heavy Duty at $65 and
9" Heavy Duty at $78

The Service you get out of tools depends on what's built into them.

One of the most versatile tools in the complete Black & Decker line is the husky Black & Decker Portable Electric Sander. The same tool that does such an efficient job of sanding metal, wood, stone or tile converts quickly and easily into a tool for grinding, wire brushing, planing or buffing.

And Black & Decker Sanders can take it! They've got the power, stamina and speed to keep going on continuous, heavy-duty production or maintenance work—to turn out better work, *faster*. That's because each part in every Black & Decker Tool is specifically designed and made for the job it has to do.

For example, the spiral bevel gears in Black & Decker Sanders are cut in matched pairs. Each pair is carefully lapped together until they mesh perfectly. The result is pair after pair of flawlessly matched gears—made completely by Black & Decker—for a smooth, quiet flow of power from motor to spindle.

Next time you buy electric tools, get the extra satisfaction that's built into every product of Black & Decker—world's largest manufacturer of portable electric tools. There's a Black & Decker Distributor near you as a ready source of information and supply. The Black & Decker Mfg. Co., 616 Pennsylvania Ave., Towson 4, Maryland.

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Black & Decker

PORTABLE ELECTRIC TOOLS

NICKEL ALLOYS AID THE CHEMICAL INDUSTRY

to KEEP 'EM PRODUCING!

Stainless Steel Lined Polymerization Reactors in Synthetic Rubber Plant

Equipment of Stainless Steel, Nickel and Monel meets many specialized requirements

Chemical engineers have met America's wartime challenge.

They opened the gates to a mighty flood of products going to war... strategic raw materials, synthetic substitutes, and entirely new substances having advantages all their own.

A factor in this production success is the wide use of stainless steel, Monel, and other corrosion-resistant alloys containing Nickel.

For in the chemical industry corrosion is a large-scale menace.

To wage war on this enemy, chemical engineers enlisted the aid of Nickel, because Nickel imparts to other metals strength and resistance to corrosion and wear. In the chemical field, as in many others, a little Nickel goes a long way to keep equipment producing.

It prolongs the life of processing apparatus, and protects the purity, color, and uniformity of the product.

Hence, stainless and Nickel alloys are specified widely for acid heaters and caustic coolers, for high-pressure autoclaves and vacuum evaporators, for cracking towers and polymerization reactors, for shipping drums and tank cars, for pumps, piping and storage tanks, for agitators and settlers, for stills and digestors—for every type of equipment that converts laboratory experiments into full-scale chemical operations.

For years we have enjoyed the privilege of cooperating with technical men of the chemical industry... and of many others. Whatever your industry may be ... if you want help in the selection, fabrication, and heat treatment of alloys ... we offer you counsel and data.

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New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects—from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

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OXYGEN REGULATOR
Engineers specify . . .

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DIE CASTINGS

There is a definite advantage to our military fliers when they can take to the oxygen rare altitudes, and dive down at enemy aircraft. But there is a vital problem, too. They must have an oxygen supply delicately timed to prevent "blacking out" in the stratosphere or an "oxygen jag" at low levels. What they need — and have — is an automatic Demand Oxygen Regulator which "does its own thinking."

Here is proof of the adaptability of Auto-Lite die castings to the most exacting instrument construction. In the case of the Oxygen Regulator limits of one ten-thousandths of an inch are secured in final finish. "Controlled Metals" result from such practices as spectrographic analysis, metallographic studies, physical testing, x-ray inspection and heat treating. Write us about your problem today.

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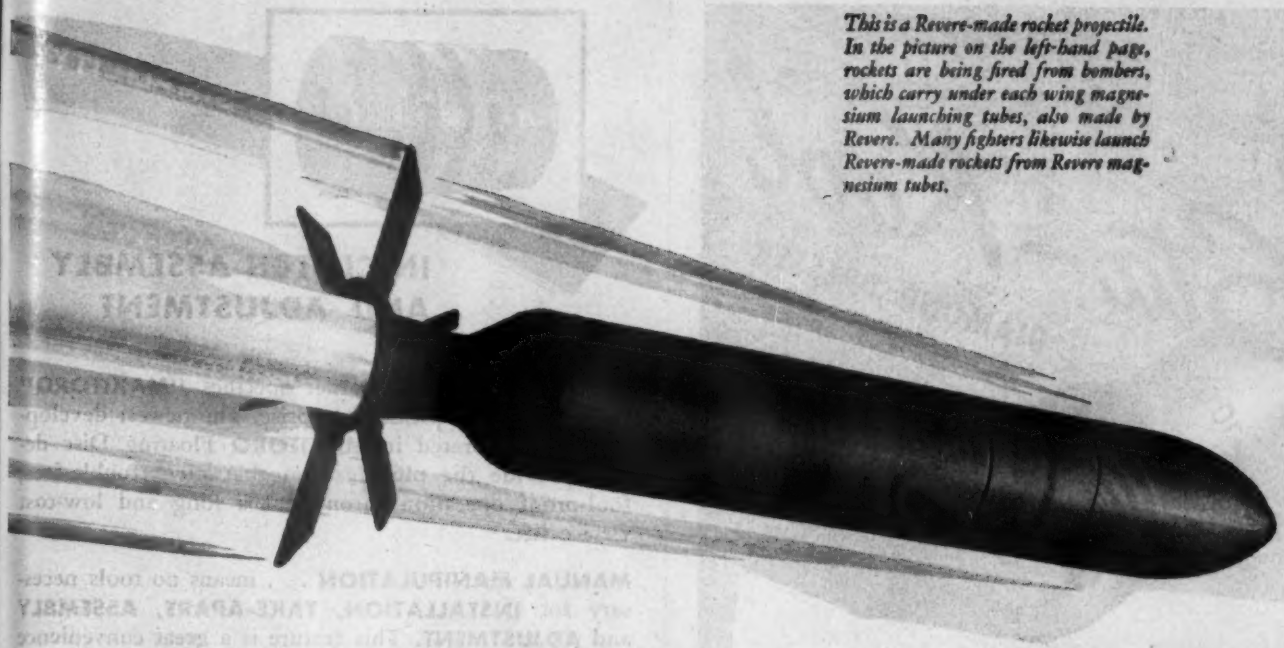
Die Casting Division
WOODSTOCK, ILLINOIS

600 S. Michigan Ave., CHICAGO 5, ILLINOIS
723 New Center Bldg., DETROIT 2, MICHIGAN

BUY WAR BONDS

TUNE IN AUTO-LITE'S RADIO SHOW "EVERYTHING FOR THE BOYS"—EVERY TUESDAY NIGHT—NBC NETWORK



This is a Revere-made rocket projectile. In the picture on the left-hand page, rockets are being fired from bombers, which carry under each wing magnesium launching tubes, also made by Revere. Many fighters likewise launch Revere-made rockets from Revere magnesium tubes.

It's GOT to be PERFECT!

Revere has made over two million rocket projectiles out of Revere Electric Welded Steel Tube

Rocket Projectile Facts

Propelling charge is a special powder producing great heat and pressure as it burns.

High-explosive head contains pentolite, 20% more powerful than TNT.

Projectile has the devastating effect of a 105-mm. shell.

Unlike a shell, a rocket is fired without recoil, and hence can be discharged from a plane, from ships too small to carry artillery, or from light launching apparatus used by ground troops.

Rocket projectiles are used to destroy fortifications, tanks, planes, ships, submarines, and against enemy troops, in France, Italy, Russia, and the Pacific.

They are probably the most effective of projectiles per pound and per dollar.

Thus the war comes rocketing to an earlier end!

Look at that rocket projectile streaking through the air faster than the airplane flies!

Think of the terrific heat and pressure required to propel that rocket with such amazing speed and accuracy!

And then remember this:—Revere not only developed those projectiles at Army Ordnance request, but has made over two million rocket projectiles and rocket targets out of Revere Electric Welded Steel Tube.

Any steel tube suitable for such a purpose must be not merely good, but PERFECT. It must pass a pressure test of over 5000 pounds per square inch!

What this means to YOU

It will be great good news to you that today our facilities are so large that we are once again able to fill commercial orders, on a priority basis only.

If you need steel tube for boilers, condensers, water and steam lines, or for general pressure or mechanical applications, consult Revere. We will not only supply high-pressure electric welded steel tube, but will cooperate with you in working out any problems in specifications, selection or installation. Revere has been welding steel tube electrically for 25 years. We *know how*.

May we work with you *now* in formulating your plans for the use of steel tube?

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Avenue, New York 17, N.Y.

Picture at left reproduced from original by Robert Lindgren, Art Editor, AIR NEWS, September issue.

For Finish-Dressing

This improved, patented tool holder provides a fast and accurate means of truing and dressing grinding wheels. Equipped with internal coolant ducts for wet grinding, and external cooling fins for dry grinding, both metal setting and stone are kept at safe operating temperatures, eliminating diamond fracture due to overheating. Tool life is thus prolonged, effecting savings from 30 to 50 per cent in diamond dressing and truing costs.

For rough-dressing "Smitite" Cluster Diamond Tools are available, in which the stones may be completely consumed without resetting.

Catalog on request.

J. K. SMIT & SONS

157 Chambers St., New York 7, N.Y. 6400 Tireman Ave., Detroit 4, Mich.

IN CLUTCH ASSEMBLY AND ADJUSTMENT

If your next purchase order specifies **"MAXITORQ"** you're due for a pleasant surprise. The newest developments incorporated in **MAXITORQ** Floating Disc design provide the plus features that give trouble-free, fool-proof operation throughout a long and low-cost service life.

MANUAL MANIPULATION . . . means no tools necessary for **INSTALLATION, TAKE-APART, ASSEMBLY** and **ADJUSTMENT.** This feature is a great convenience and time saver . . . a simple procedure that can't go wrong.

The **FLOATING DISCS** are kept free from each other when in neutral, by means of patented separator springs. You can see between them . . . and thus appreciate that drag and the consequent abrasion and heat are absent.

The **"MAXITORQ"** insures fast power pick-up, speeds production and improves the performance of normal machine tools as well as the delicate and intricate controls used on newly developed war production instruments.

The **"MAXITORQ"** is well worthy of your early investigation.

SINGLE and DOUBLE, Wet and Dry Types

The **CARLYLE JOHNSON MACHINE COMPANY**
MANCHESTER, CONNECTICUT

NEW CATALOG No. 4 now on the press. May we send you a copy?

Made in both single and double clutches in capacities from ¼ to 5 H.P. at 100 R.P.M. Also in Pulley and Cut-off Coupling types.

MAXITORQ *floating* **DISC CLUTCH**

You can see between the discs

IN NEW PRODUCT DESIGN...

Checking an airplane engine part using a ROTAB *in connection with Meehanite cube and surface plate.*

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Ready to Serve You — NOW

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Flint, Mich.	General Foundry & Mfg. Co.
Hamilton, Ohio	The Hamilton Foundry & Machine Co.
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Los Angeles, Calif.	Kinney Iron Works
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Pittsburgh, Pa.	Rosedale Foundry & Machine Co.
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THE TREND IS TO MEEHANITE

A *new* development engineered and designed by Machine Products Corp., Detroit, is ROTAB, a flexible machining and checking device which permits complete machining or checking of all angles of a unit without disturbing the original clamped position.

When designing this equipment only Meehanite castings were considered because in Meehanite each design factor is known dependable and uniform. Modulus of elasticity, tensile strength (up to 55,000 lb. p.s.i. as cast) transverse strength, impact values, —all have been established by test, proved in service, and assured during manufacture by Meehanite process controls.

In planning your new product or redesigning an old one—investigate the economies and service available to you.

Write Engineering Service Department

MEEHANITE RESEARCH INSTITUTE
NEW ROCHELLE, N. Y.

Ask for Bulletin No. 12
"DESIGN WITH CONFIDENCE"

UNIFORMITY

Uniformity is an outstanding feature of Chicago "Safety Plus" Socket Screw Products. Each and every piece is alike as two peas in a pod... Machining on modern precision equipment designed and built to maintain the closest production tolerances, plus inspection after each operation on the latest type automatic gauging devices—adds up to a uniformly accurate product ideally suited for quick and trouble-free assembly.

Other outstanding features are: ✓ electric furnace alloy steel ✓ clean, true heads ✓ sharp, full threads ✓ accurate sockets and exceptional holding power.

On your future requirements specify Chicago "Safety Plus" Products.

These Fine Products are sold only thru Authorized Distributors

THE CHICAGO SCREW CO.

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Contains over 1300 pages of latest, dependable data on all branches of machine shop and drafting room practice—2500 illustrations, diagrams, and tables—hundreds of useful facts for any plant.

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AMERICAN MACHINISTS' HANDBOOK

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Just where can any worker find as much and so wide a variety of helpful material as is given in this well-planned and well-organized handbook? Just think of being able to find the answer—the *right* answer—to any question—*quickly*—layouts, feeds, speeds, tools, jigs, fixtures, materials, standards, tolerances—a wealth of the most useful information applicable to problems that arise in every type of shop or plant, whatever its size, whatever its special problems.

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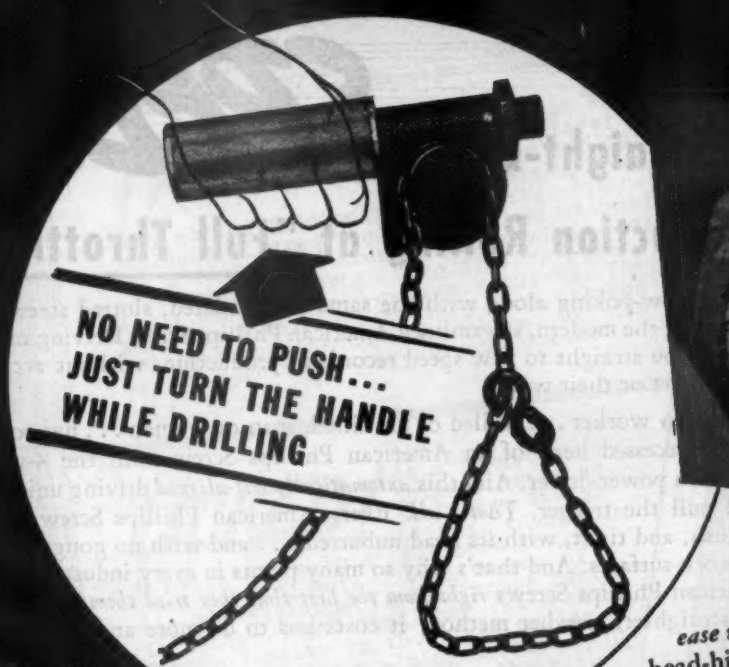
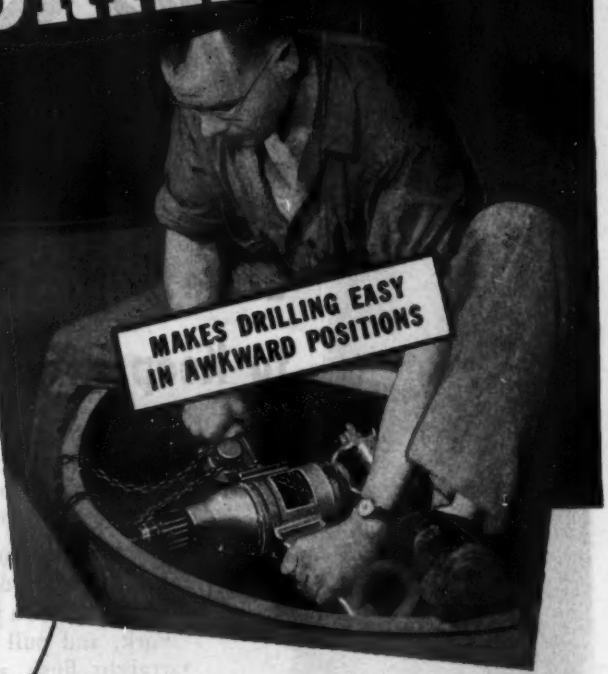
MAKE ANY DRILLING JOB in any position EASIER with this *Pressure Handle* on a SKILSAW DRILL!





● Now you can drill with *extra ease* and *extra safety* in any position . . . head-high, overhead or on ladders . . . by simply attaching this Pressure Handle to your SKILSAW DRILL *or any make of drill.* Pressure Handle gives the operator complete control of drilling pressure at all times . . . eliminates twist drill breakage . . . saves the time of an extra man with ropes or chains to hold the drill.

Fits SKILSAW DRILL Models "64", "80", "82", "83", "101", "103", "121", "123", "141", "143", and all other makes of electric or pneumatic drills of from ⅜ in. to 1 in. capacity in steel.

Sold Nationally Through Skilsaw Distributors for $30.

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SKILSAW PORTABLE ELECTRIC TOOLS
MAKE AMERICA'S HANDS MORE PRODUCTIVE

AMERICAN Phillips SCREWS

drive with Straight-Line SPEED

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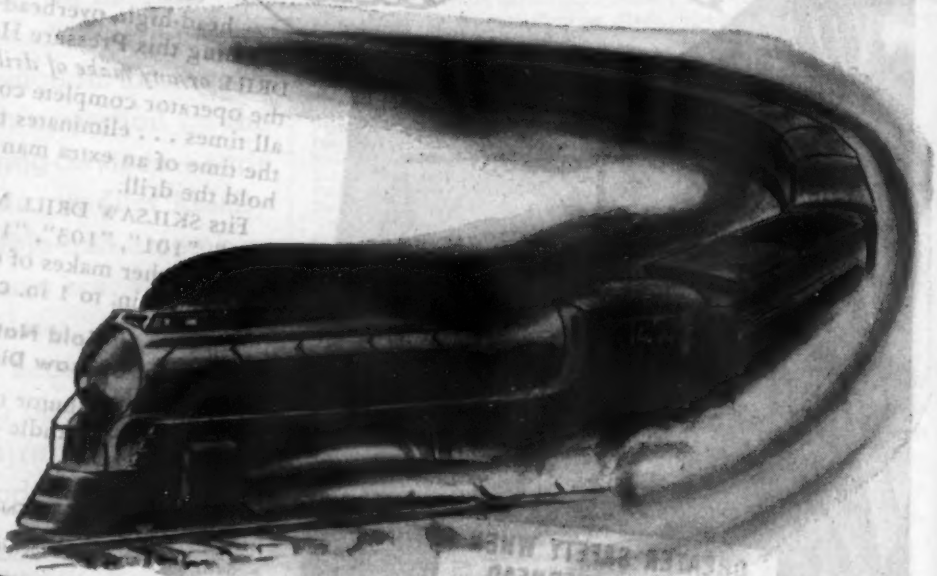
Are you slow-poking along with the same old outdated, slotted screws? . . . Or are you using the modern, streamlined American Phillips Screw Driving method which drives you straight to new speed records in production, without accidents either to workers or their work?

All that *any* worker . . . skilled or unskilled, man or woman . . . has to do is this: Fit the recessed head of an American Phillips Screw onto the 4-winged Phillips bit of a power-driver. Aim this *automatically self-aligned* driving unit at the work, and pull the trigger. *That's all.* Every American Phillips Screw sets up straight, flush, and tight, with its head unburred . . . and with no gouges on surrounding work-surfaces. And that's why so many plants in every industry keep on using American Phillips Screws *right from the first time they tried them* . . . because with this straighter, speedier method, it costs less to do more and better work.



4-WINGED DRIVER CAN'T TWIST OUT OF ENGINEERED TAPERED RECESS IN AMERICAN PHILLIPS SCREW HEAD

AMERICAN SCREW COMPANY

PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois Street Detroit 2. 502 Stephenson Building

Put the Screws on the enemy . . . BUY BONDS!

DAYTON V-BELT DISTRIBUTORS HELP SOLVE UNIQUE DRIVE PROBLEMS

TROUBLE!

A war-busy Washed Sand & Gravel Company ran into trouble aplenty. They worked into coarser deposits. Big boulders clogged the buckets, and stopped the 9" x 36" jaw crusher repeatedly. Their belts were slipping. More driving power and a scalping screen were required. They were skeptical because they were cramped for room underneath the machine. But the Dayton V-Belt Distributor was called.

LICKED!

As a result, the company switched to Dayton V-Flat Drives, running 8 belts off a 10.6" V-Groove pulley on a 50 H.P. Motor, over to one of the 36" Fly wheels. (55 inches center to center.) And then they ran 3 more Dayton V-Belts up to a flat pulley operating a new scalping screen. Slippage stopped. Shut-downs were eliminated. Trouble was licked. And the boss claims "A better appreciation of Dayton V-Belts than I had before."

Your Dayton V-Belt Distributor is Glad to Help You Lick Drive Troubles

Whenever you have *any* power transmission problem . . . of conversion, or of redesign, or a check-up of trouble or loss of efficiency from your present drives, call in the Dayton V-Belt Distributor. He will engineer and help you install the quick, dependable, smooth-running, full-positive-power-transmission of Dayton V-to-V or Dayton V-Flat Drives.

Remember, the name Dayton Rubber stands for Technical Excellence in Synthetic Rubber development. And your Dayton V-Belt Distributor is there to bring you every benefit of Dayton's 38 years of successful assistance to Industry.

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The World's Largest Manufacturer of V-Belts

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MAINTAIN VICTORY SPEEDS—CONSERVE YOUR TIRES

V-Belts by Dayton Rubber

U.S. TRADE MARK THE DAYTON RUBBER MFG. CO.

The Mark of Technical Excellence in Synthetic Rubber

ALLEN
Dowel Pins

PRECISION pins for accurate locating of work; for retention of tool and die assemblies under severest stresses. Ground to a limit of .0002" over basic size, with an allowable tolerance of plus or minus .0001".

Metallurgically in the class of ALLEN Hollow Screws:—made of the same special-analysis ALLENOY steel and heat-treated with the same scientific controls. The outer surface is extremely hard with a core of sufficient hardness to resist any tendency to "mushroom" when driven into a tight hole.

Ask your local Industrial Distributor for samples and dimensional data,—the same Allen Distributor who serves your interests with the most dependable supply-items in all lines.

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Available from Stock
= 0-80 and = 1-72
SCREWS and NUTS
Brass or Steel, Cut Thread
Class 3 Fit

Waltham is also equipped to furnish all types of
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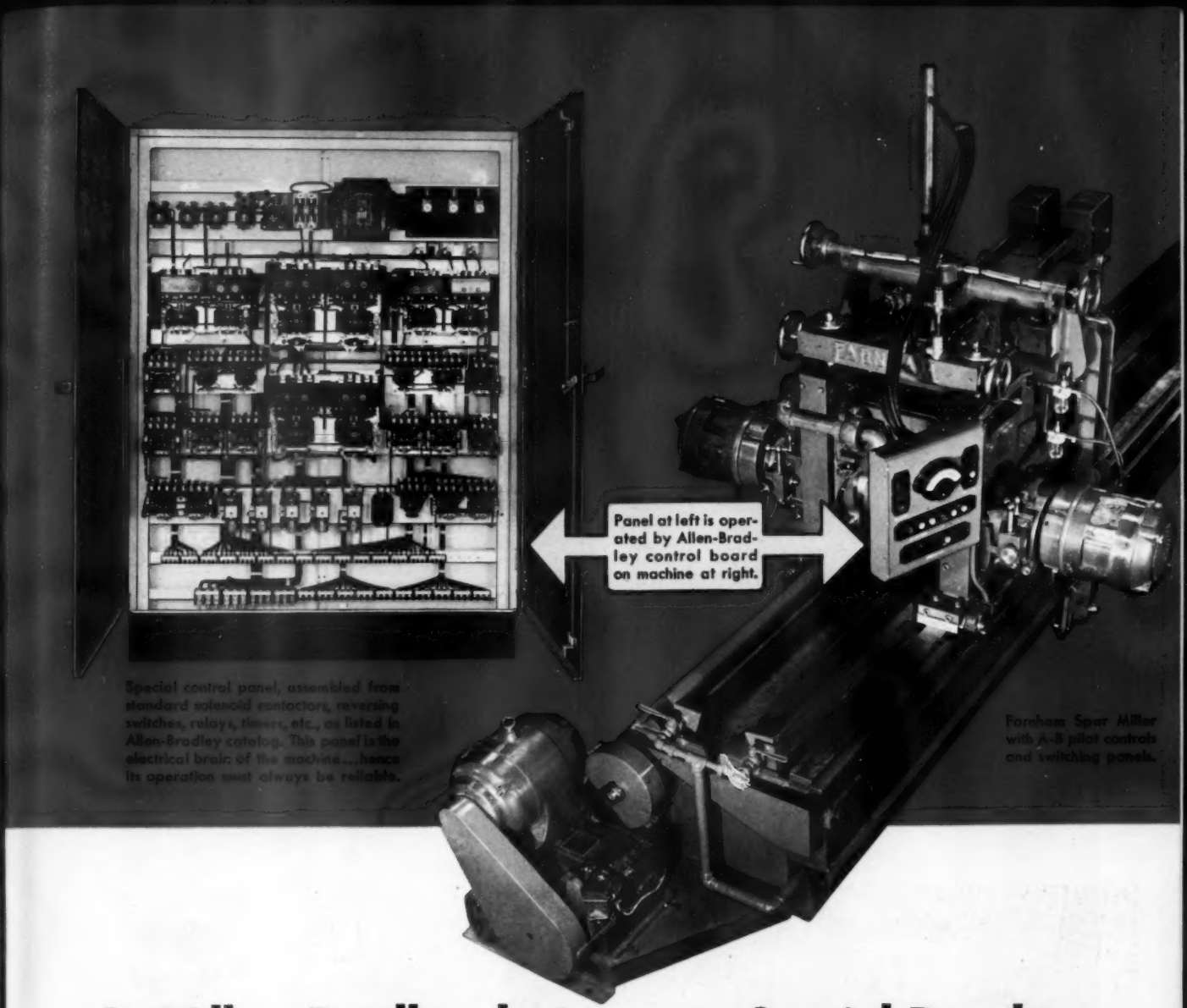

Panel at left is operated by Allen-Bradley control board on machine at right.
Special control panel, assembled from standard solenoid contactors, reversing switches, relays, timers, etc., as listed in Allen-Bradley catalog. This panel is the electrical brain of the machine...hence its operation must always be reliable.
Farnham Spar Miller with A-B pilot controls and switching panels.

Let Allen-Bradley design your Special Panels

To assure maximum satisfaction to your customers in the performance of your automatic sequence control machines, don't use untried, unknown electrical units on your control panels. Don't experiment . . . don't risk the reputation of your company by using parts of uncertain performance and quality. Let Allen-Bradley engineers design and build special panels of standard units for your motor-driven machines which are field-tested and are backed by Allen-Bradley reputation for quality control. Make Allen-Bradley your control engineering department . . . and avoid complaints.

TYPICAL ALLEN-BRADLEY STANDARD UNITS FOR ASSEMBLING SPECIAL PANELS

RELAYS | STARTERS | COMBINATION | REVERSING | CONTROL STATIONS | LIMIT SWITCHES

ALLEN-BRADLEY

SPECIAL PANELS FOR MACHINE TOOLS

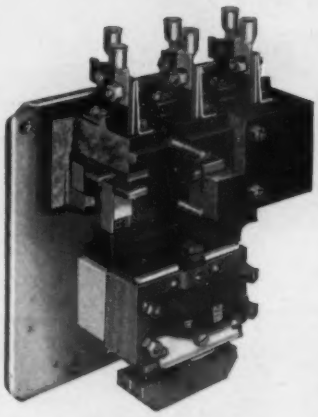
QUALITY

Big or Small

all Bulletin 709 Starters are Solenoid-Operated

The five Allen-Bradley Bulletin 709 solenoid starters, shown below, have been making notable control history for the past ten years.

The first starter, introduced in 1934, was Size 1 for 5 hp., 220 v., 7½ hp., 440-550-600 v. It smashed all performance records of clapper switch starters and, for the first time, made possible precision motor control for machine tools. It set the pattern for modern motor control design and performance.



Sectional view of 150 ampere Bulletin 709 starter showing solenoid plunger, contacts, and terminals, all mounted on steel plate.

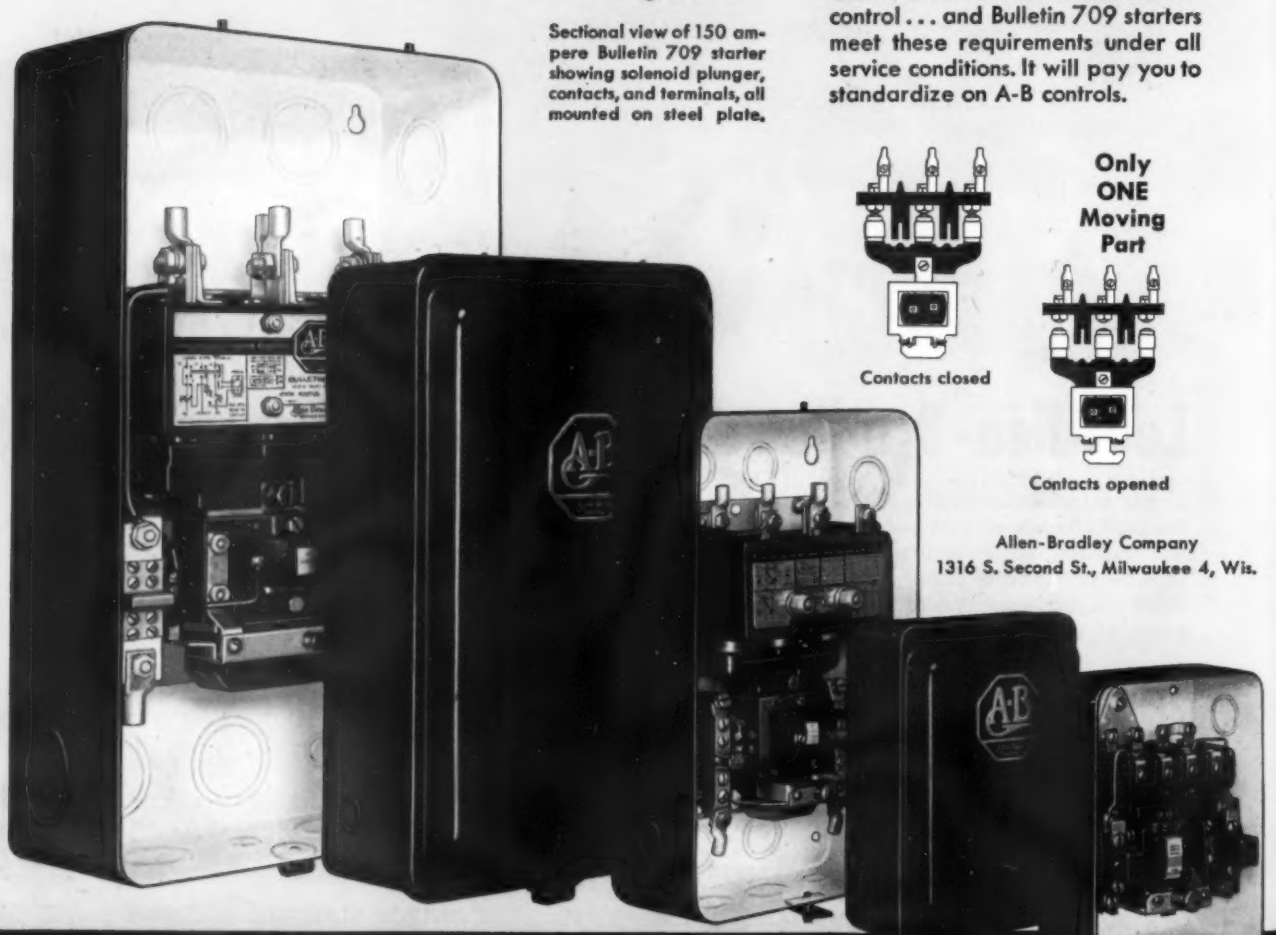
Since then, four more sizes have followed, extending the Bulletin 709 line up to 50 hp., 220 v., and 100 hp., 440-550-600 v. In all sizes, the highly successful Allen-Bradley solenoid principle is used. Only one moving part . . . no pins . . . no pivots, hinges, or bearings . . . no contact maintenance . . . no variation in switching performance. No starter is so simple . . . nor so trouble-free.

Unfailing dependability and accuracy in opening and closing of circuits are essentials in machine tool control . . . and Bulletin 709 starters meet these requirements under all service conditions. It will pay you to standardize on A-B controls.

Contacts closed

Only ONE Moving Part

Contacts opened



Allen-Bradley Company
1316 S. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

Century is helping to meet

INDUSTRY'S No. 1 PROBLEM

—Making more jobs by helping manufacturers *make more and better products at a lower cost.*

Tough job? Sure! But American industry and ingenuity will do it!

The manufacturers of machine tools and other types of processing equipment are modernizing their designs with one purpose in mind—to help John Q. Public get more and better products at a lower cost.

Business realists realize that this is the only *practical* method of opening the public's purse strings—and thus, through stimulated demand, build increased production and more jobs.

Electric motors are production tools, too—a component part of the production tools they drive. Hundreds of leading designers who know that Century motors are designed with various combinations of engineering features to meet specific production problems are taking advantage of the production cost saving possibilities of Century motors.

Century's national organization of motor specialists is helping production machinery and appliance manufacturers effect savings in original design, as well as savings in production output.

This means that the *entire business public*—from the manufacturers of production equipment down through the fabricators of thousands of products, the wholesaler and retailer—all of whom are trying to deliver a better product to the final user at a lower cost—have a direct or indirect stake in how well the Century organization does its job of helping others to make more jobs.

If you are a manufacturer of motorized production equipment or appliances—call the nearest one of Century's 31 branch offices.

A Century Motor Specialist can be of greatest help while your design is in the experimental or drafting board stage.

Century C MOTORS

CENTURY ELECTRIC COMPANY · 1806 Pine Street, St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

HOW HYATT BRINGS SIMPLICITY TO MACHINE DESIGN

No Shims–No Nuts
No Lock Washers
No Threading of the Shaft

The introduction of Hyatt Hy-Load Bearings opened up a new vista to machine designers—precision built bearings of varying types to carry heavy loads at slow speeds or lighter or medium loads at higher speeds—some types even take care of intermittent thrusts.

Their narrow widths permit simplicity of design and economy of construction and the complete interchangeability of inner or outer races with the race or roller assembly combinations is especially advantageous for handling on the assembly lines or benches.

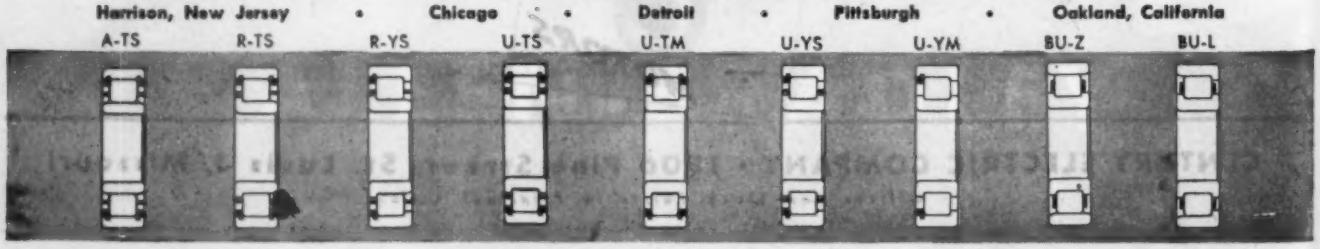
The separable inner race type shown above is one of the nine types of Hyatt Hy-Load Bearings now available to suit any conditions of application.

• • •

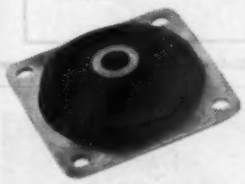
Consultation with Hyatt Engineers on bearing problems makes it easy for users to be sure that the bearing selected is the right one and the application is technically correct. A 48-page Bulletin No. 541 covers this range of bearings. Send for it if desired.

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION

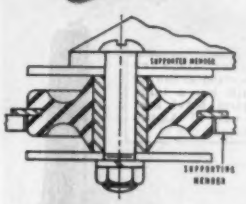
Harrison, New Jersey • Chicago • Detroit • Pittsburgh • Oakland, California

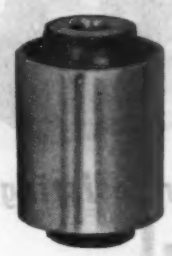


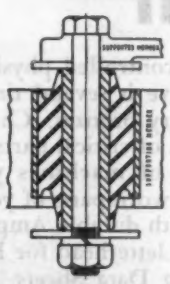
Plan now for future design . . .



LORD PLATE FORM MOUNTING







LORD TUBE FORM MOUNTING

What are you going to do—what are you going to make—how are you going to make it—in the post-war world?

It's going to be a different, and we hope a better world. But it's going to be a faster-moving world; nerves, more than ever, are going to be under strain.

Faster trains, faster cars, faster planes—and more of them; faster machinery, faster production lines—it all means more vibration, more strain on the nervous system; and much greater need for vibration control.

For over twenty years the Lord Manufacturing Company has pioneered the application of shear type rubber mountings for the control and isolation of vibration. The war has greatly accelerated both the science of vibration control and the recognition of its practical necessity and financial economy. Every U. S. military plane, as an instance, has many units, from the giant engines to the most delicate instrument, protected from harmful vibration with Lord Shear Type Mountings.

Whatever you manufacture or plan to manufacture, if its efficiency is affected by vibration, internal or external, Lord engineers can help you. In the meantime, our free literature will bring you up to date in your general information on vibration control.

LORD
BONDED RUBBER
Shear Type
MOUNTINGS

Buy More War Bonds

IT TAKES RUBBER *In Shear* TO ABSORB VIBRATION

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ERIE, PENNSYLVANIA

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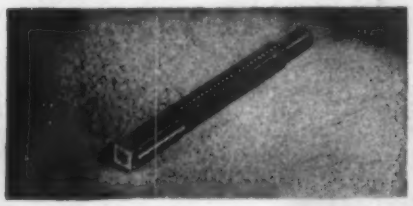
CANADIAN REPRESENTATIVES:
RAILWAY & POWER ENGINEERING CORP., LTD.
TORONTO, CANADA

Originators of Shear Type Bonded Rubber Mountings

PRECISION PARTS



ACE MACHINING ON THE BEAM

This is a vital part of an air-borne instrument. Its beam picks out a bomber's target below the clouds. It helps bring the crew home safely after the mission. It helps avoid mid-air collisions.

Ace manufactures these parts complete from stainless-steel bar-stock. Each piece is roughed out on a screw-machine and then the square milled on the end. It is then cylindrically ground and the flats are surface-ground. After completing these operations, the threads are ground from the solid blank.

Working with close tolerances on a mass-production basis is an Ace accomplishment that offers many worthwhile advantages. If you are thinking in terms of small parts or assemblies, it will pay you to consult with Ace. Send sample blueprint or sketch for quotation.

ACE

TRADE MARK

ACE MANUFACTURING CORPORATION

for Precision Parts

1207 E. ERIE AVENUE, PHILADELPHIA 24, PA.

A Complete Service Under One Roof

Whether your job requires machining, grinding, or stamping . . . and whether it involves drilling, threading, or hardening . . . Ace is set-up to handle each operation. Responsibility at Ace is not divided. Time at Ace is not wasted.

BUYER NO. 3 POPS THE QUESTION

The ALL-METAL LOCK is Built-in Here

"OPERATORS OF 110,000 MOTOR VEHICLES

indicated that if a vibration-proof nut like the above were standard on their post-war equipment, tens of thousands of dollars for maintenance and repairs would be saved.

Motion Picture—"All Work And No Play"—16 mm. sound—30 minutes. Write for information Dept. A-10.

Do loose nut breakdowns lower the trade-in value of *your* vehicles?

More than 1100 operators of 110,000 vehicles said, "YES!" in a recent survey.* They named over 60 trouble centers where loose nuts cut machine life, and 3 out of 4 asked for "a good, all-metal nut that vibration *will not loosen*."

The Boots Self-Locking Nut meets their exact requirements. In a test on many trucks, twelve months of hard-driving wear and tear couldn't shake it loose from a single connection.

Secured by its built-in lock, it holds with a steel grip. Removed with an ordinary wrench, it can be used again and again without accelerated locking loss. Won't slip in oil, water, chemicals.

Boots Aircraft Nut Corporation, General Offices, New Canaan, Conn.

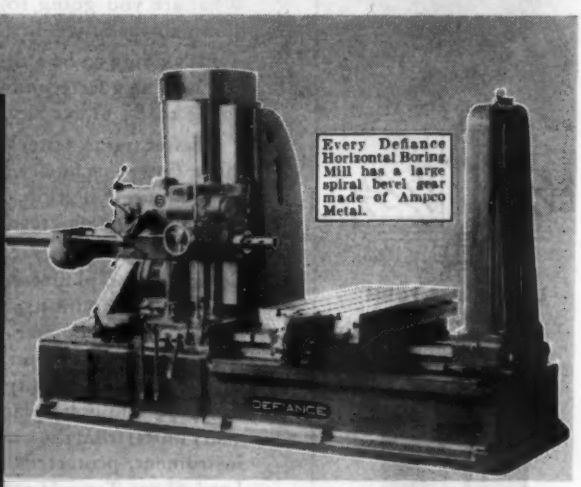
BOOTS

SELF-LOCKING NUTS

"There's No Excuse for a Nut Shaking Loose"

Representatives in New York, Chicago, Detroit, Indianapolis, Los Angeles, Kansas City, Dallas, Toronto, Montreal, Vancouver

Guarded against delays due to metal failure...



M-11

— with parts of wear-resisting

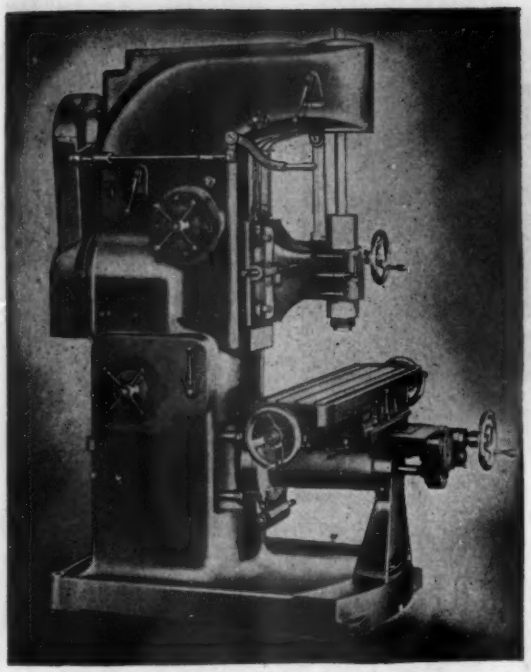
Ampco Metal

Like the builders of Defiance Horizontal Boring Mills, over 90 leading machine tool makers use Ampco Metal wherever they need exceptional strength, hardness, and resistance to wear, shock, and fatigue. This superior aluminum bronze alloy has controlled physical properties that give it several times the life of ordinary bronzes. Check for this protection of critical parts in the specifications of machines you buy. And replace worn parts of your older machines with durable Ampco. Write on business letterhead for File 41 of Engineering Data Sheets.

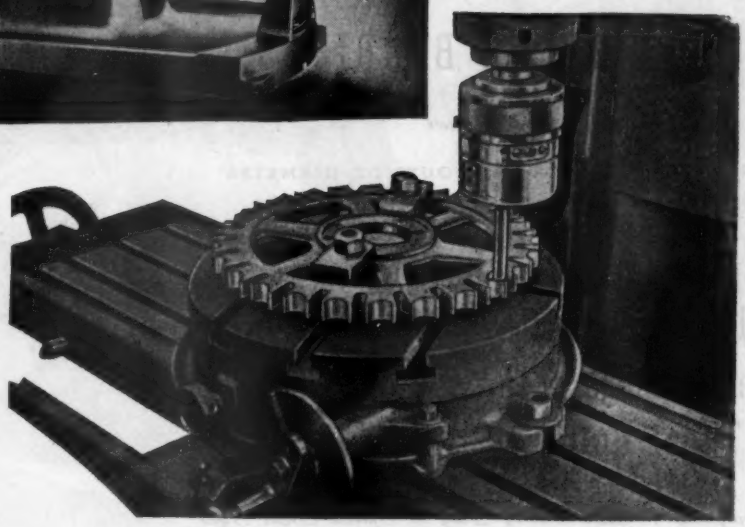
AMPCO METAL

The Metal without an Equal

Ampco Metal, Inc., Dept. AM-11, Milwaukee 4, Wis.



THE VERSATILE ALL-PURPOSE KNIGHT Miller EQUIPS YOU FOR UNUSUAL CAPACITY



You get that all important "ACCURACY"

The geneva cam in this picture illustrates a typical job requiring accurate milling, boring, and spacing. The slots between the cam tracks held to be the same width and depth, the cam tracks all the same radius, and the spacing from center to center of each exactly the same. This was done quickly as well as accurately on a KNIGHT Miller equipped with indexing rotary table.

- ★ Speed and Accuracy for light milling
- ★ Power and Rigidity for heavy cuts
- ★ Difficult and Unusual Parts handled quickly and accurately without special equipment
- ★ Limited and Special Production done economically and quality maintained without special tooling
- ★ Internal and External Milling done at one setting

● The KNIGHT Miller's wide range of spindle feeds, solid table unit, ease of handling combine with other features to give you unusual capacity whether for light milling, heavy milling, or precision boring.

These milling machines will perform and produce at any of their speeds and feeds to the full capacity of the motor installed.

Capacity too is realized because of the short time necessary for making set-ups even though they are difficult ones. Additional set-ups in most cases are eliminated — some are greatly simplified.

There is quick and accurate location of holes and surfaces—particularly so when dial indicators are used. To change vertical settings you simply move the spindle rather than the work. Added to all this is the fast method of changing cutting tools.

To get the full story on the fast, compact, complete, and convenient-to-handle KNIGHT Miller, write for catalog.

KNIGHT VERSATILE MILLERS ACCURATE · RIGID

IMMEDIATE DELIVERY SUBJECT TO PRIOR ORDER

W. B. KNIGHT MACHINERY CO.
• ST. LOUIS, MISSOURI •

Contact **KAYDON** of Muskegon

For Unusually Large, High Precision Bearings

BALL and ROLLER BEARINGS

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FROM 6" INSIDE DIAMETER TO 100" OUTSIDE DIAMETER
COMMERCIAL FINISH OR SUPER PRECISION

Spherical Roller Bearings
Radial Ball Bearings • Thrust Ball Bearings
Radial Roller Bearings • Thrust Roller Bearings
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Straight or Self-aligning . Extra Heavy Duty or Special Light Type

LIGHT WEIGHT NON-METALLIC CAGES OR STANDARD BRONZE TYPE

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PRECISION MACHINE WORK OR GRINDING

to unusual accuracy in large diameters

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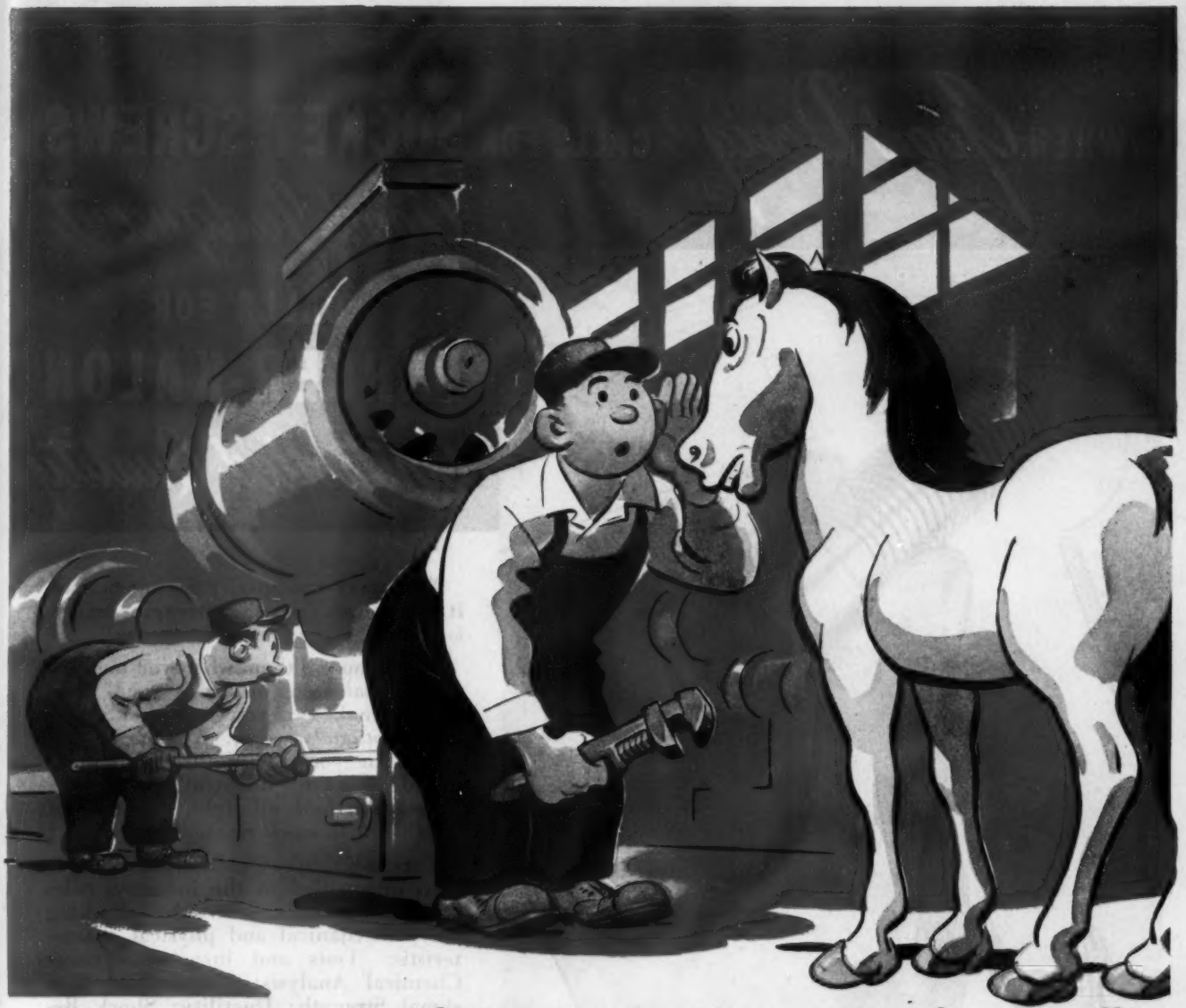
KAYDON

For excellence in production of extremely precise, unusually large ball and roller bearings

THE KAYDON ENGINEERING CORP.
McCRACKEN STREET • MUSKEGON, MICH.
New in Name . . . Old in Experience



Don't Be Fussin' and Fixin'— Get Horsepower by Howell

The Howell Protected Type Motor, shown, gives complete protection against dripping liquids, metal chips and other falling particles. Completely streamlined — utilizing non-breakable steel frame — malleable or steel base — cast iron end plates and cast iron, weatherproof terminal box are standard construction features. Special horizontal and vertical mountings are available.

Available in sizes 5 H.P. and smaller.

REPAIR MAN: I'd like to wrap this wrench around the guy's neck who insulated this motor.

HORSE: I know how you feel about sloppy work.

REPAIR MAN: Here we are at the peak of production, and what happens? Motor failure . . . tear down the machine . . . lose time . . . get behind — all because the motor wasn't built right in the first place.

HORSE: My good man, stop worrying! Use Howell Motors. The entire stator of every Howell Motor is triple-treated with Howell Bond varnish. It is made to withstand temperatures up to 350° F. — is water and oil proof and grease resisting, and it will not break or crack. The rotors are copper, too, and the best grade bronze or ball bearings are used. You just can't buy better motors.

REPAIR MAN: That's right! I know it! I'm specifyin' HOWELL for all my new jobs.

Phone the nearest Howell representative today, or write direct to the factory for prices, data and delivery dates on Howell standard or specialized motors for every industry, up to 150 Hp.

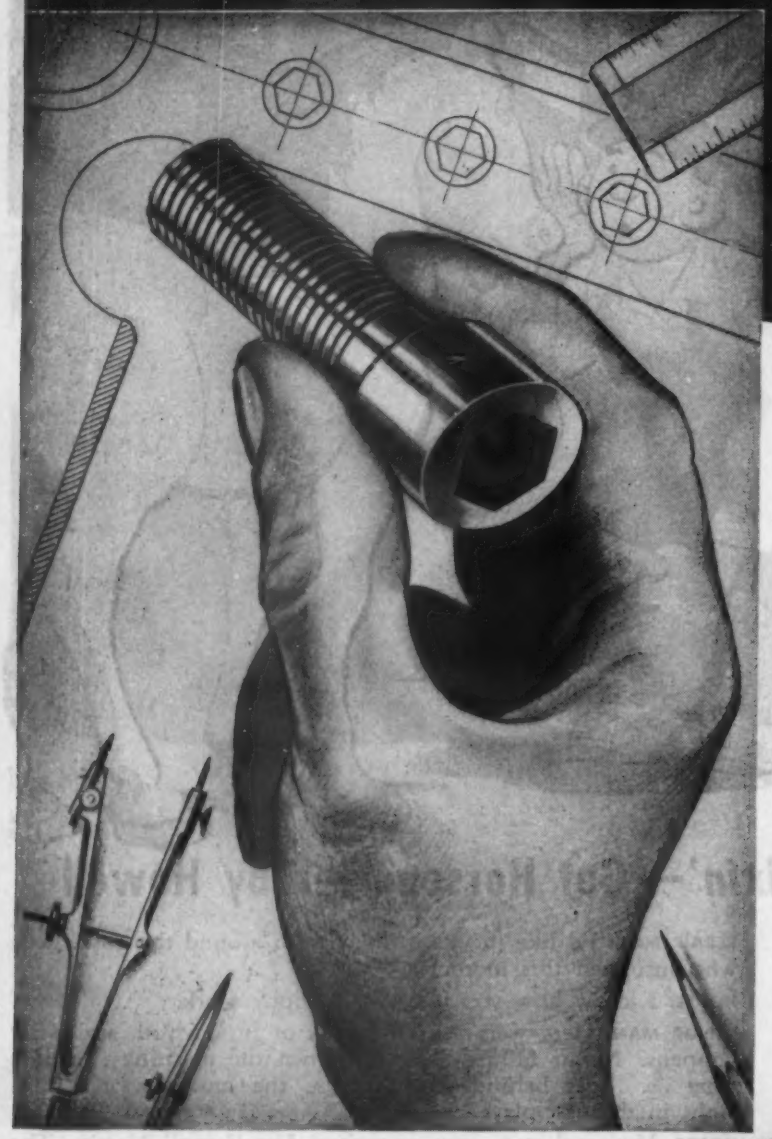
HOWELL ELECTRIC MOTORS COMPANY

HOWELL, MICHIGAN

Manufacturers of Quality Motors Since 1915

WHEN *Good Design* CALLS FOR SOCKET SCREWS

Good Judgment CALLS FOR PARKER-KALON *Controlled Quality*

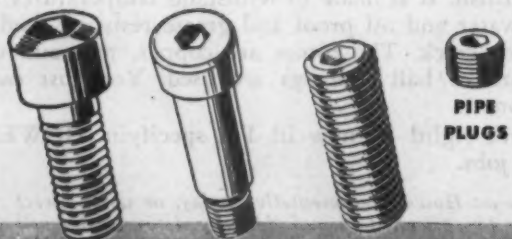


Whenever you specify Socket Screws, it is because you need strength, safety, compactness, or other advantages.

Since you use them when you need an *exceptional* fastening, it is good judgment to make sure you get Socket Screws of *exceptional* quality. At such critical points in your assemblies, you can't afford to have "doubtful" screws . . . screws that *look* all right, but some of which fail to *work* right.

Parker-Kalon's Quality-Control routine, unequalled in the industry, rules out "doubtful" screws by checking every mechanical and physical characteristic. Tests and inspections cover Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Torsion and Shear; Hardness; Head and Socket Size and Position; Thread Fit.

Specify Parker-Kalon Socket Screws next time you order . . . they cost no more. Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.



PIPE PLUGS

CAP SCREWS STRIPPER BOLTS SET SCREWS

PARKER-KALON *Quality-Controlled* SOCKET SCREWS

A product of PARKER-KALON ... Specialists in Fastening Devices

SYMBOLS OF PRECISION

★

Incredibly accurate and rapid in fire the British 25 Pounder has so amazed the enemy that captured Germans could not believe it was hand-fed—they asked to see "your automatic artillery."

★

● In the famous British 25 Pounder, as manufactured by Sorel Industries Limited of Quebec, Canada for the British and Canadian Armies, practically every bearing is a Bunting Cast Bronze Precision bearing, because great endurance, finest precision and silk-smooth operation are vital.

For machines of war or peace there are no finer bearings than these. Made special to blueprint, or supplied in standard sizes, Bunting Bronze Bearings meet every requirement—both invasion and production. Write for catalog . . . The Bunting Brass & Bronze Company, Toledo 9, Ohio. Warehouses in Principal Cities. 7

Bunting

BRONZE BUSHINGS ☆ BEARINGS ☆ PRECISION BRONZE BARS

THE BEARING METAL FOR 9 OUT OF 10 APPLICATIONS

More often than not bearing failure can be traced to improper selection of metal for the lining. Choice of alloy *should* be dictated by the type of load under which the bearing operates.

In 90% of all applications the load is uniform and pressure moderate, as is the case with electric motors, line shafting and machinery in general. For such service, the metal to select is the one having the best anti-frictional qualities.

MAGNOLIA ANTI-FRICTION METAL has the lowest coefficient of friction of any known bearing alloy—one-third that of genuine babbitt. Is it any wonder that this is the best known, most widely used of all maintenance bearing metals?

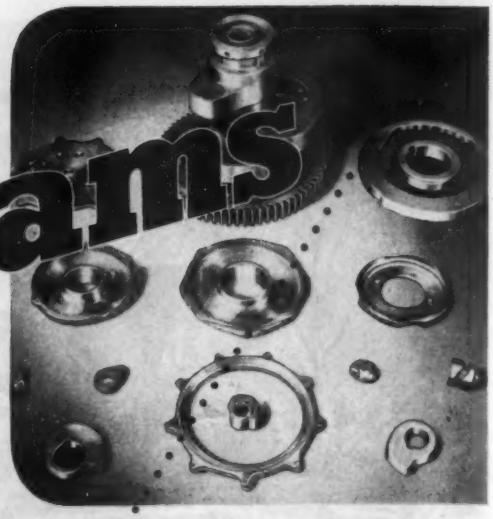
If you have never used MAGNOLIA, why not give it a try in one of your *trouble spots?* Order from your distributor . . . no priority required.

MAGNOLIA METAL COMPANY
18 West Jersey Street
Elizabeth 4, N. J.

MAGNOLIA METAL CO. OF CANADA, LTD.
2028 Manufacturers Street
Point Ste. Charles, Montreal

MAGNOLIA BEARING METALS

Cams



● **25 YEARS** of experience in making special cams for thousands of companies has made us experts at cam cutting and grinding. Our facilities and equipment, the most complete of any plant in the country, permits us to manufacture any style or size of Cam, Geneva Motion, or Scroll Plate in quantities of 1, 10 or 10,000. Accuracy can be held to split thousandths, and surfaces to micro-finishes. Send us specifications or blueprints and we will be glad to submit a detailed quotation to you on your requirements.

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STAND-BY for DEPENDABILITY

Specify TUTHILL GENERAL-PURPOSE PUMPS *for Long, Economical Service*

Low first cost and negligible maintenance have made the Tuthill Model C general-purpose pump a stand-by for dependability throughout industry. Simple in design, compact, and built for rugged service, this internal-gear rotary pump is ideal for handling non-corrosive liquids. It operates efficiently in either direction of rotation. Capacities from 1 to 200 g.p.m. at pressures up to 100 p.s.i. Direct-drive, belt drive, V-belt units and stripped models available.

Write for Model C Bulletin.

TUTHILL PUMPS are serving Army • Navy • Air Force Merchant Marine and Industry

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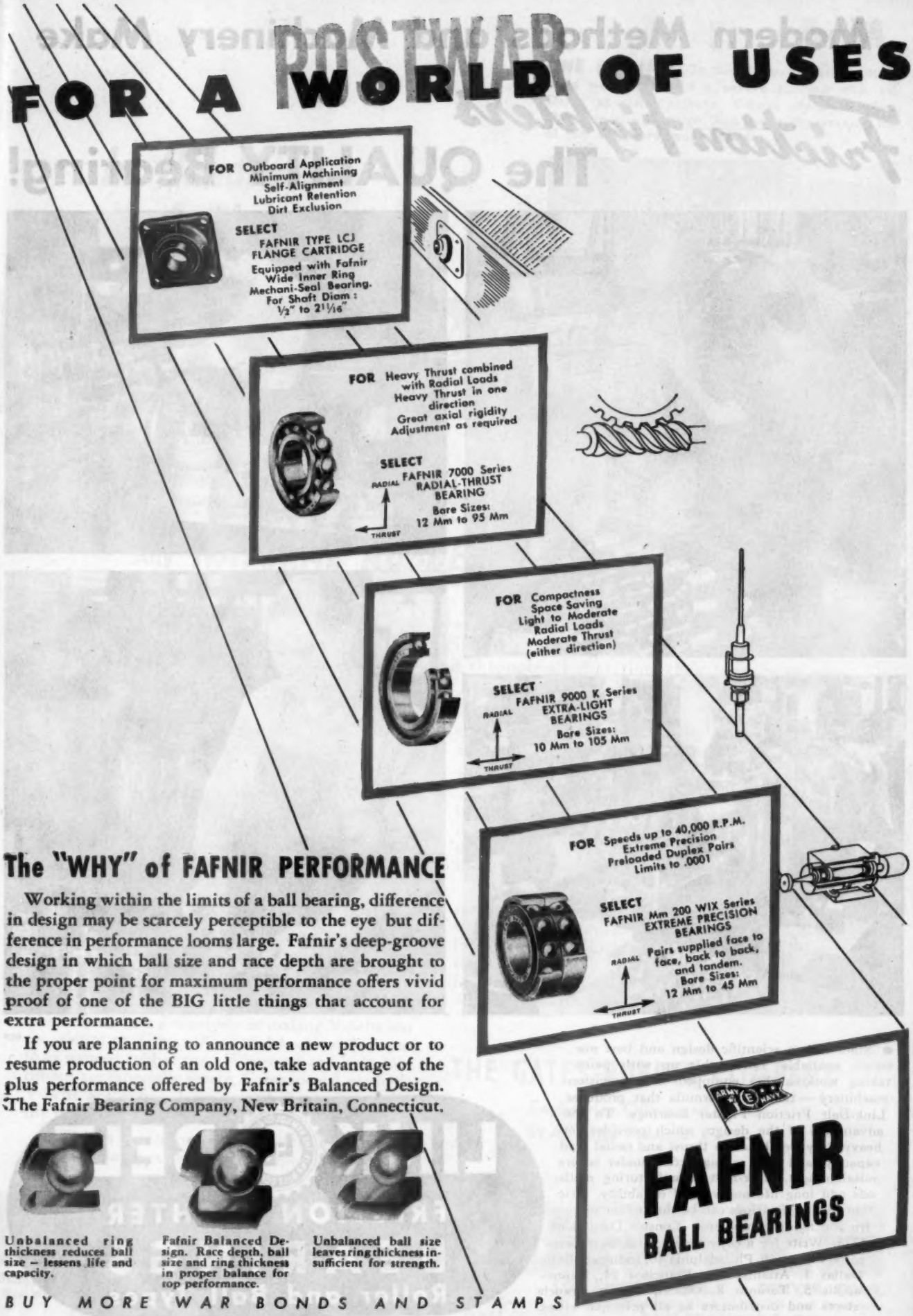
939 E. 95th St. • Chicago 19, Illinois

POSTWAR FOR A WORLD OF USES



The "WHY" of FAFNIR PERFORMANCE

Working within the limits of a ball bearing, difference in design may be scarcely perceptible to the eye but difference in performance looms large. Fafnir's deep-groove design in which ball size and race depth are brought to the proper point for maximum performance offers vivid proof of one of the BIG little things that account for extra performance.

If you are planning to announce a new product or to resume production of an old one, take advantage of the plus performance offered by Fafnir's Balanced Design. The Fafnir Bearing Company, New Britain, Connecticut.

Unbalanced ring thickness reduces ball size – lessens life and capacity.

Fafnir Balanced Design. Race depth, ball size and ring thickness in proper balance for top performance.

Unbalanced ball size leaves ring thickness insufficient for strength.

FAFNIR
BALL BEARINGS

BUY MORE WAR BONDS AND STAMPS

Modern Methods and Machinery Make *Friction Fighters* The QUALITY Bearing!

9673

● Start with a scientific design and best materials available, follow this up with painstaking workmanship equipped with precision machinery — that's the formula that produces Link-Belt Friction Fighter Bearings. To the advantages of the design, which provides for heavy duty, combination thrust and radial load capacity, and free rolling action under severe misalignment, Link-Belt manufacturing methods add long life and rugged durability. Friction Fighter Bearings can be the answer to *your* friction fighting problems. Consult Data Book 1775. Write for a copy today. Link-Belt Company, Chicago 9, Philadelphia 40, Indianapolis 6, Dallas 1, Atlanta, San Francisco 24, Minneapolis 5, Toronto 8. Offices, factory branch stores and distributors in all principal cities.

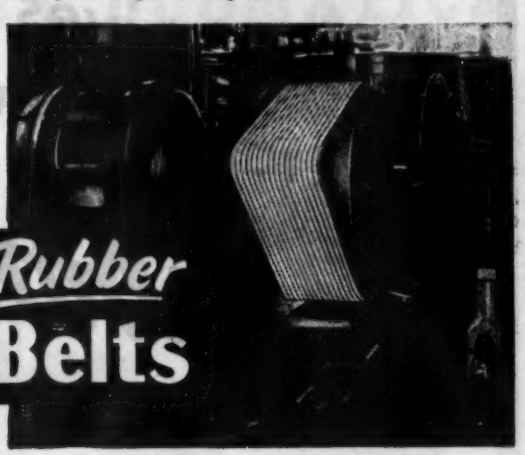
LINK-BELT

FRICTION FIGHTER

BEARINGS

Roller and Ball Types

ONE EXAMPLE: On this drive, operating conditions gave the belts a severe soaking with oil. Gates special synthetic V-belts were installed. They are giving more than twice the service life of any belts previously used.



In Hundreds of Plants—

GATES Synthetic Rubber V-Belts

Are OUTWEARING Any NATURAL RUBBER V-BELTS Ever Used!

Now that every V-Drive in your plant depends upon belts made of synthetic rubber it pays to know that Gates Synthetic Rubber V-belts have been in nation-wide use for *more than 6 years*—and through all that time they have been giving service actually superior to belts of *natural rubber!*

There is naturally a reason for this marked superiority of Gates synthetic rubber belts—and here it is:

Gates began making large quantities of belts entirely of synthetic rubber long before synthetic rubber came to be thought of as merely a *substitute* for natural rubber. Gates used synthetic rubber not as a substitute but as an *improvement*— in fact, Gates chose a very *special* synthetic for the one reason that it is, in many important respects, *greatly superior* to natural rubber.

*There are, of course, many kinds of synthetic rubber. Gates uses each kind where it best meets some particular service need.

For Example:—One special synthetic rubber which Gates uses extensively in making V-belts has the ability to withstand oil and heat much better than natural rubber can. Where oil and heat conditions are especially severe, Gates special synthetic V-belts are giving 3 times to 4 times the service life of any natural rubber V-belts ever used.

This is the record not of a few belts over a limited period but of thousands upon thousands of Gates synthetic rubber V-belts installed in hundreds of plants and factories during the past 6 years.

Gates long headstart and outstanding success in making V-belts of synthetic rubber is of greater importance to you now than ever before because the entire operation of your plant today depends so largely on synthetic rubber V-belts.

You will gain a distinct advantage in V-belt service and operating efficiency by picking up your telephone directory and calling the Gates Rubber Engineer. (Just look under the heading "Gates Rubber.") He will bring right into your plant the full benefits of Gates' knowledge and experience —without the slightest obligation.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

4411

GATES VULCO ROPE DRIVES

CHICAGO, ILL.	NEW YORK CITY	ATLANTA, GA.	LOS ANGELES, CAL.	DENVER, COLO.
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DETROIT, MICH.	PORTLAND, ORE.	DALLAS, TEXAS	SAN FRANCISCO, CAL.
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This new catalog gives full details about Trabon TYPE M POSITIVE CENTRALIZED LUBRICATION

Costs so little . . . centralized lubrication is now available to every machine builder and user

● Surprisingly inexpensive—easy to understand—easy to install—requiring a minimum of tubing and installation, Trabon Type "M" Lubrication enables:—

1) ***every machine builder*** to put "post-war improvements" on his machines today—

2) ***every machine owner*** to secure ***positive*** lubrication of every bearing, avoiding costly downtime, while an oiler crawls around lubricating each bearing manually,—the breakdown if he misses one.

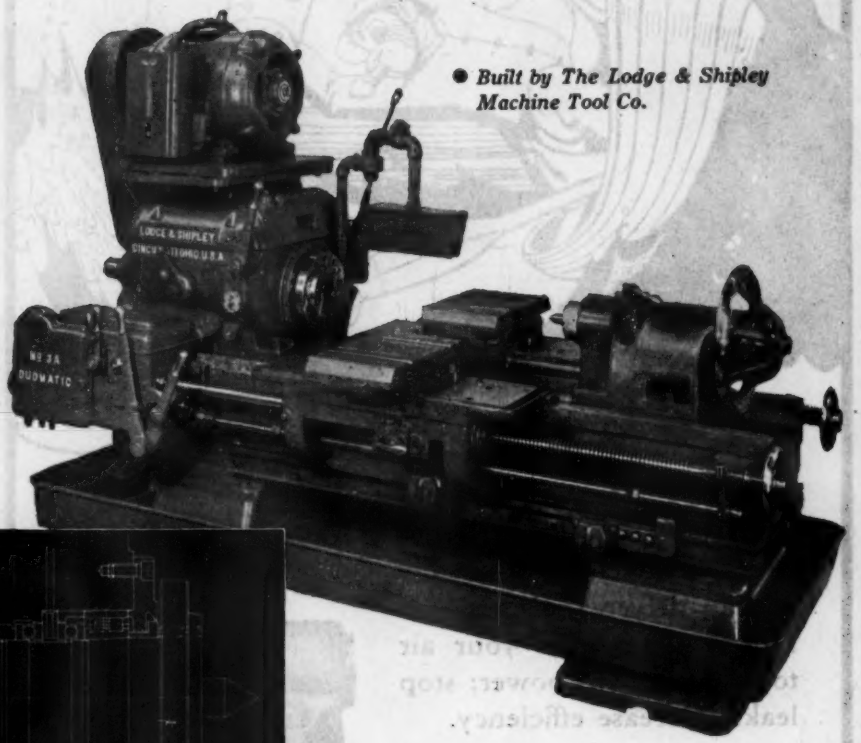
New, but thoroughly service-proved in thousands of installations covering an extremely wide variety of services, Trabon Type "M" Lubrication is just what you've been looking for. It warrants your closest, most thorough examination. Get the complete story—It's in Bulletin No. 442—Send for a copy today.

TRABON
ENGINEERING CORPORATION

1819 East 40th Street, Cleveland 3, Ohio • Industrial Lubrication Exclusively Since 1922

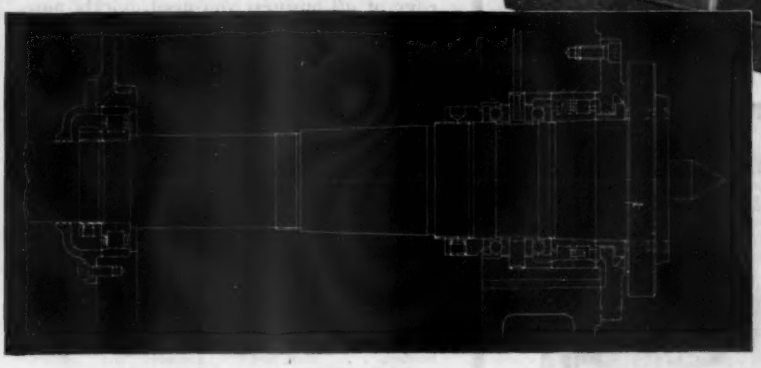
ORIGINATORS AND PATENT OWNERS OF THE SINGLE LINE REVERSING LUBRICATING SYSTEM

FOR SPINDLE RIGIDITY ON 3A DUOMATICS



● *Built by The Lodge & Shipley Machine Tool Co.*

Spindles equipped with SKF Bearings are rigid, smooth-running and have high capacity. They assure heavy cuts without chatter, smooth finishes, increased production, high speeds and extreme accuracy.



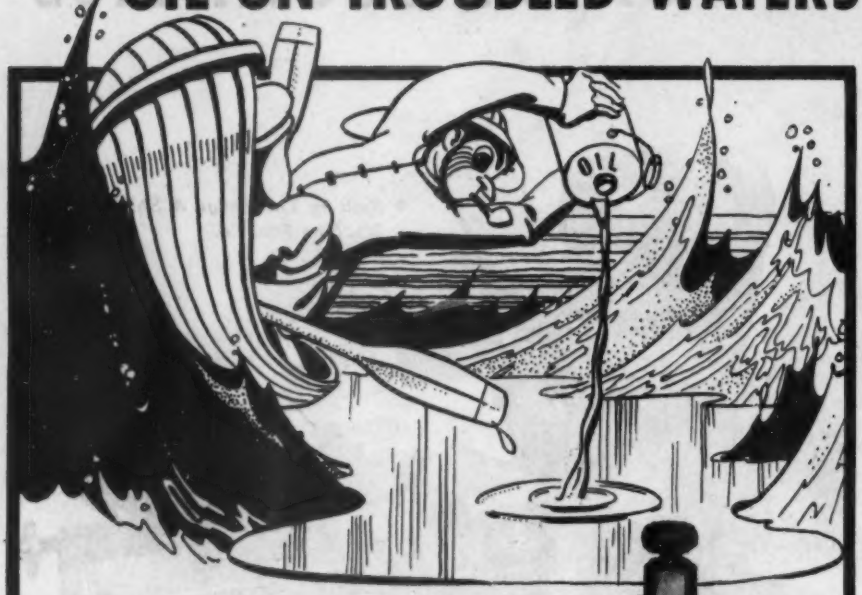
Removing just the right amount of metal from a given area is one of those tricky jobs that requires extreme accuracy at the cutting edge. It's a job on which the SKF Spindle Mounting meets the most exacting requirements. 5681

SKF INDUSTRIES, INC., PHILA. 34, PA.

SKF

ROLLER BEARINGS

Like Pouring
OIL ON TROUBLED WATERS



Norgren Lubricators

smooth out chattering, sluggish air driven tools and cylinders. They give your air tools maximum power; stop leaks; increase efficiency.

By injecting lubricant into the air stream that drives the tool, they oil every moving part. Check wear in use . . . check destructive corrosion when tool is idle.

Size for every purpose. May be used in assembly with Norgren Air Filters and Pressure Regulators. For full information, write—
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to step into a better job

WOULD YOU BE PREPARED?

These are times of change in the business world. New jobs are opening up, and they must be filled, and filled quickly—with men who are able. Here are books giving quick access to fundamentals and practices that promote executive efficiency to help you prepare yourself so that when *your* opportunity comes, you will be ready.

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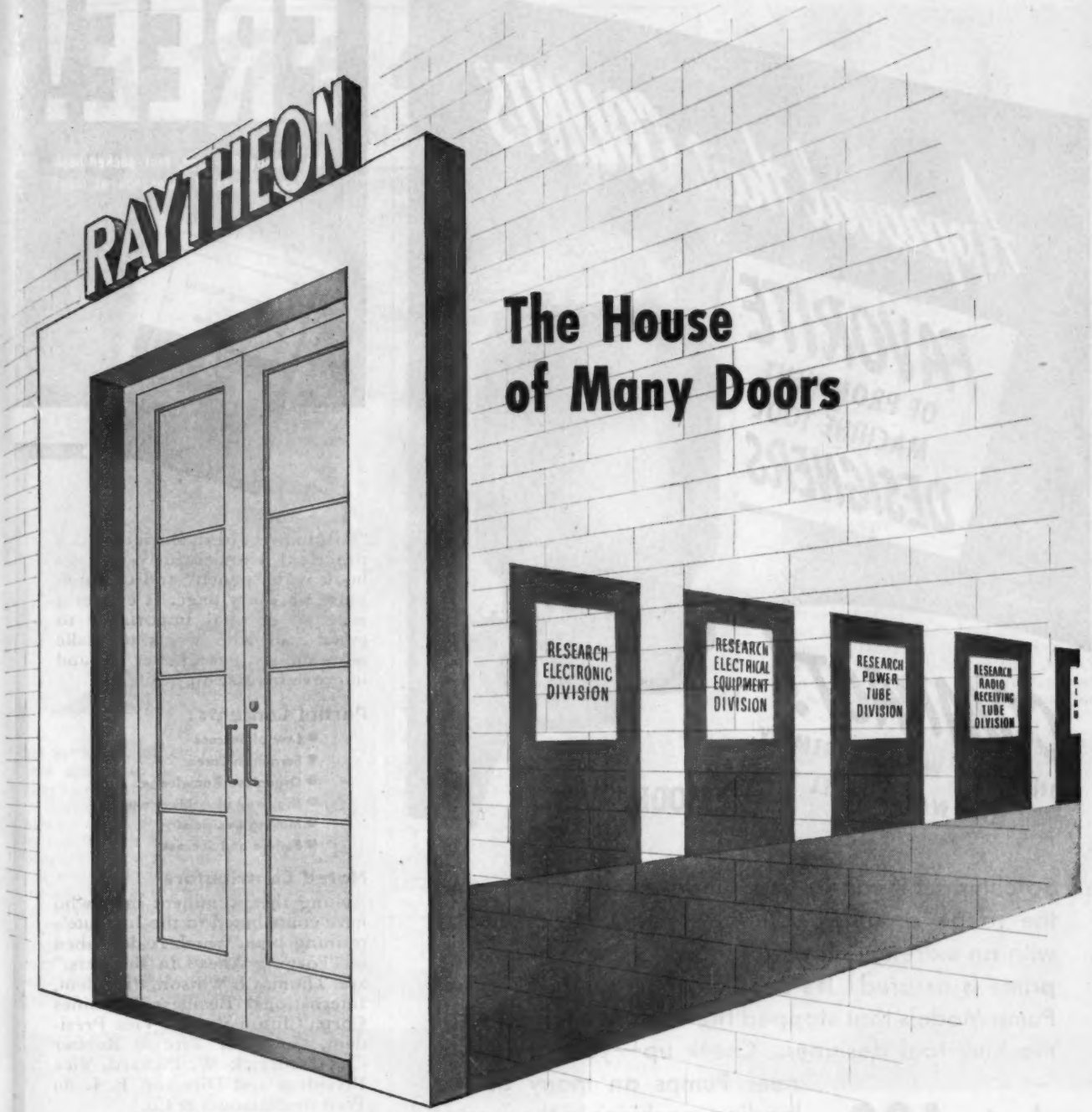

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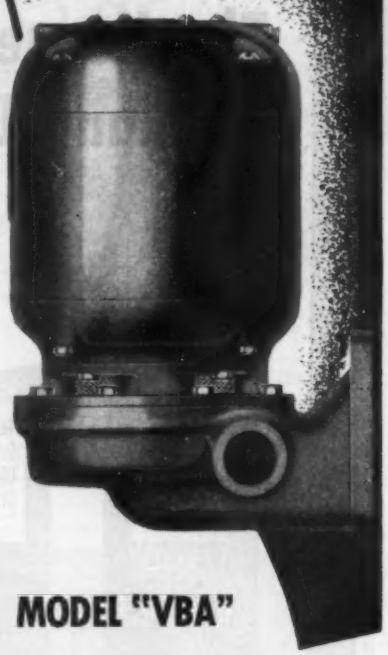

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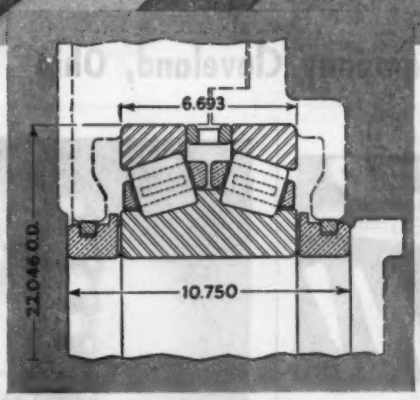
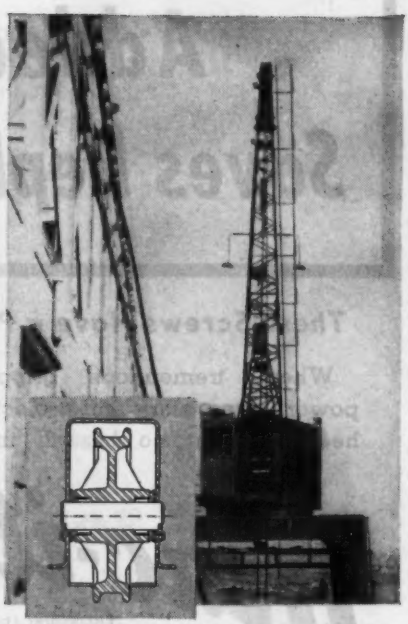
IN THE NEWS
WITH TORRINGTON BEARINGS

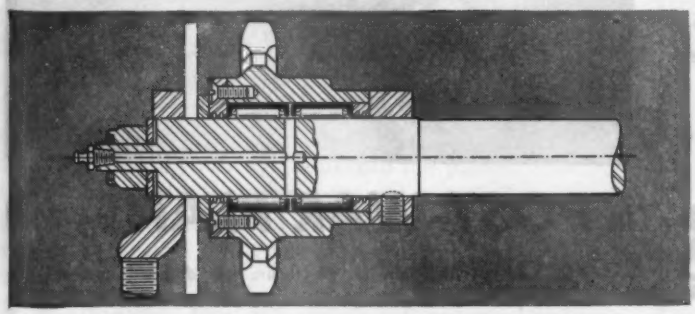
THIS 80" FOUR-HIGH CONTINUOUS HOT STRIP MILL, installed in one of the world's largest steel rolling plants, utilizes Torrington two-row tapered roller bearings (see cross-section) to carry the thrust loads encountered in the operation of the back-up rolls. With each row employing 23 rollers 2¼" long and 2" in diameter, these bearings have a thrust load capacity of 220,900 pounds at 100 R.P.M. Supplying the steel industry with a wide range of anti-friction bearings is an important part of the service of Torrington's Bantam Bearings Division.





THIS MAMMOTH REVOLVING GANTRY CRANE, built by the American Hoist & Derrick Company, entrusts its multi-ton loads to Torrington Needle Roller Bearings, supplied by the Company's Bantam Bearings Division. Combining the advantage of compact design and high load capacity with economy, these anti-friction bearings were specified for installation in the wheels of the crane's equalizing non-swiveling truck, as shown in the accompanying cross-section.

RIGID CONTROL in heat treatment, as in every other phase of manufacture, constitutes a major reason for the successful operation of Torrington Bearings under unusual service conditions. Several methods of heat treatment are employed depending upon the ultimate use of the bearings. Bearing materials are also selected to render the maximum service for the installation conditions. Thus, both heat treatments and materials are carefully engineered to best meet customer requirements.



SHUTTLE CARS, built by the Joy Manufacturing Company, have the distinction of being able both to carry and unload their own cargoes. Designed for the rapid transfer of coal and other materials, these cars discharge their loads within a few seconds by means of a 32" conveyor chain that rides in the center of the chassis. Accompanying cross-section shows the installation of Torrington Type NC Needle Bearings as they are employed in the take-up mechanism of the chain.

ARMY E NAVY

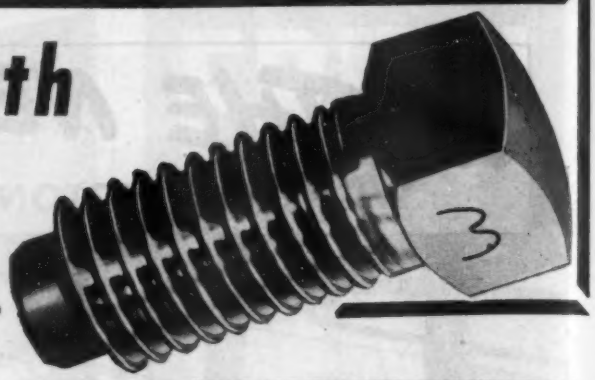
TORRINGTON BEARINGS

STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

THE TORRINGTON COMPANY • BANTAM BEARINGS DIVISION

SOUTH BEND 21, INDIANA

Added Strength Saves Replacements



These Screws Have a Place in Your Plant

Where tremendous gripping power is necessary and projecting heads present no hazard, there is no substitute for just plain strength. Broken screws, upset points and fatigue failure can be avoided by specifying stronger screws.

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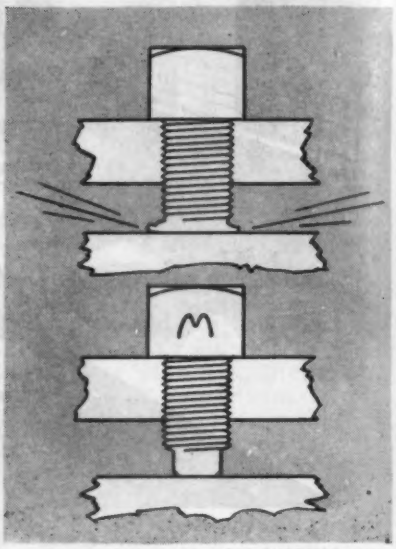

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STREAMLINED ACTION!

The newer models in Gusher pumps, like that shown are perfectly adapted to the latest type machine-tools.

Streamline *your* machines with new-model.

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Notable for simplicity of design, minimum maintenance, range of flow (from a mere dribble to maximum capacity, with no leakage), adaptability to any type machine, capacity for hard usage, and moderate cost.

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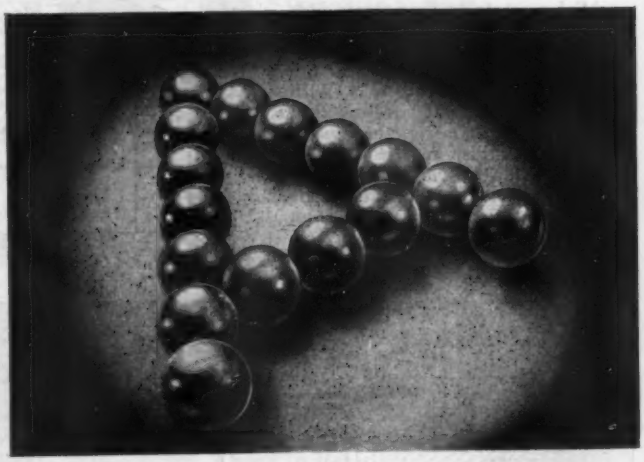
The "Gusher"—A Modern Pump for Modern Machine Tools



In POST-WAR PLANS, too!

The load-carrying jobs of the future will demand uninterrupted performance—the performance assured with ABBOTT BEARING BALLS in the assemblies.

CARRY THE LOAD AS PLANNED

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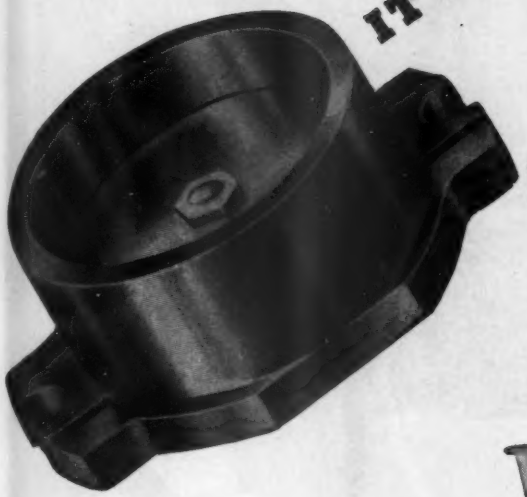
ROLL ON ABBOTT Bearing BALLS

IT KEEPS MOTORS COOL

IN "KNITTERS" OF METAL

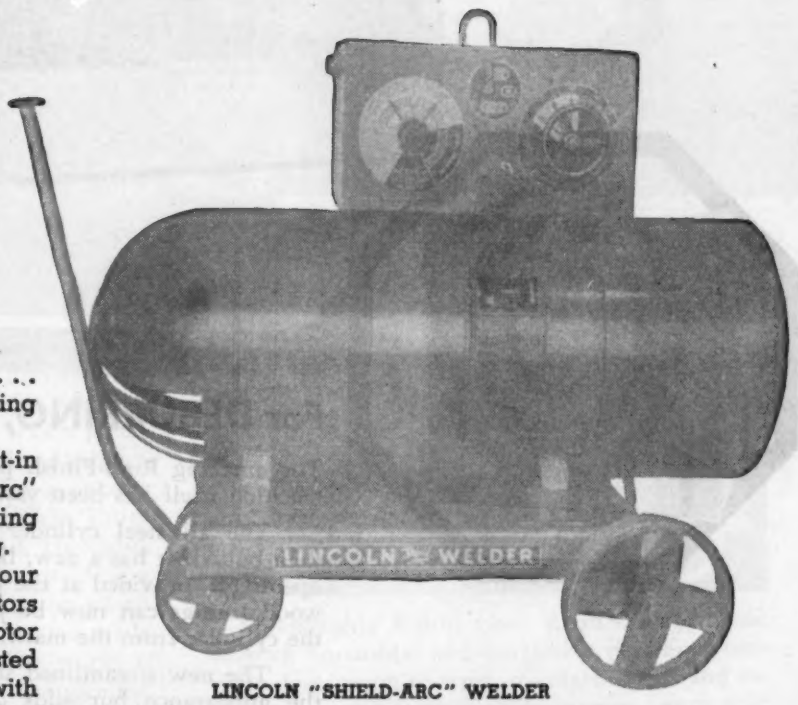


No matter what the motor application . . . whether it be in a welder or refrigerator . . . Klixon Protectors keep motors from overheating and burning out.

The Lincoln Electric Company use built-in KLIXON Protectors with their "Shield-Arc" Welders, and have reduced to the vanishing point motor failures caused by overheating.

You, too, can get full motor life from your motors by specifying Klixon Motor Protectors with every motor you buy. Built into the motor by the motor manufacturer, you get a tested and proven combination of a motor fitted with the right type and size protector. Then when the motor is in operation and gets overloaded and dangerously hot, the protector clicks "off" the power . . . when the motor cools to safety, it clicks it "on" again either by manual reset, or automatically, depending on the type of reset you specify.

Get positive overheat protection in your motors with Klixon Motor Protectors. They permit full motor operating capacity yet protect motors from burning out. Available for A.C. motors all sizes; D.C., motors up to 30 volts.

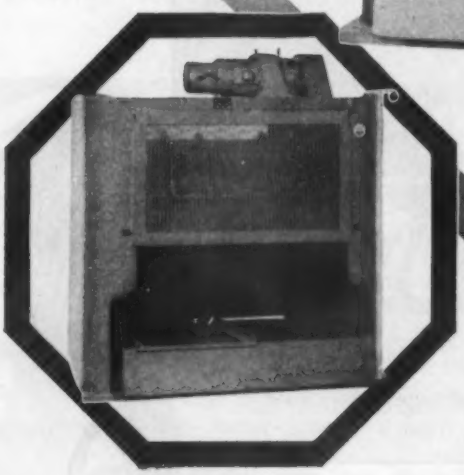


LINCOLN "SHIELD-ARC" WELDER
POWERED WITH A KLIXON PROTECTED MOTOR

KLIXON MOTOR PROTECTORS

SPENCER THERMOSTAT CO., ATTLEBORO, MASSACHUSETTS

ANNOUNCING THE NEW ROTO-FINISH WET PROCESS MACHINE BW-45 ★



For DEBURRING, GRINDING, FINISHING

The amazing Roto-Finish process gets better and better. Now the machine itself has been vastly improved.

The all steel cylinder of the new BW-45 is welded rather than bolted. It has a new, lighter weight steel door. In addition, an opening is provided at the back as well as the front. Compartment wood linings can now be periodically replaced without removing the cylinder from the machine, which saves much time in servicing.

The new streamlined sheet steel outer shell not only improves the appearance but adds considerable structural strength to the framework of the machine itself. It also provides a guard every safety engineer will heartily approve and with the heavy mesh door (shown in smaller photo at left) gives complete protection to workmen from all moving parts.

Send for complete particulars of this new machine and the Roto-Finish process that cuts finishing costs on steel, brass, aluminum, magnesium, stainless steel and nickle steel parts.

THE STURGIS PRODUCTS CO.
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ROTO
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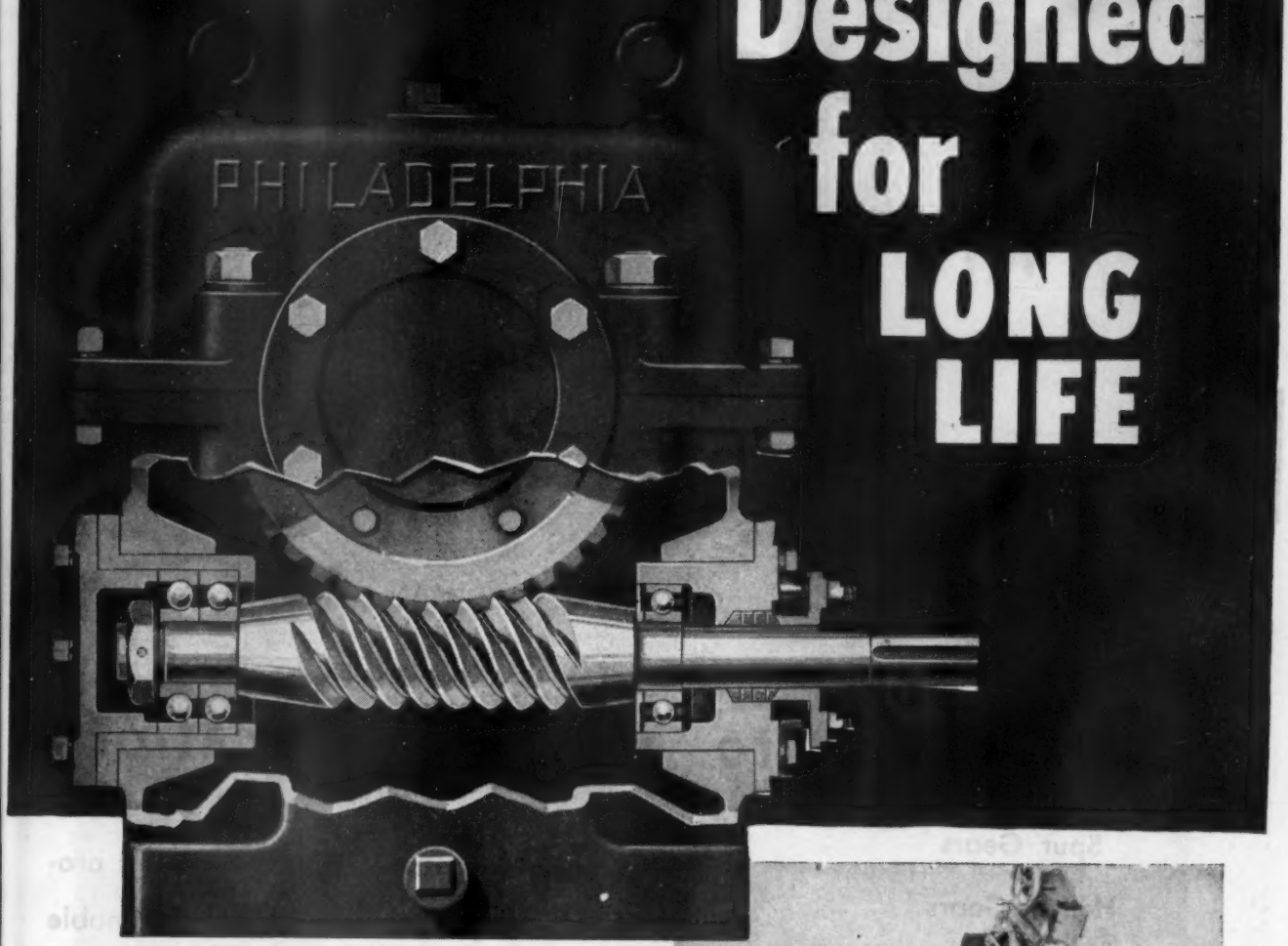
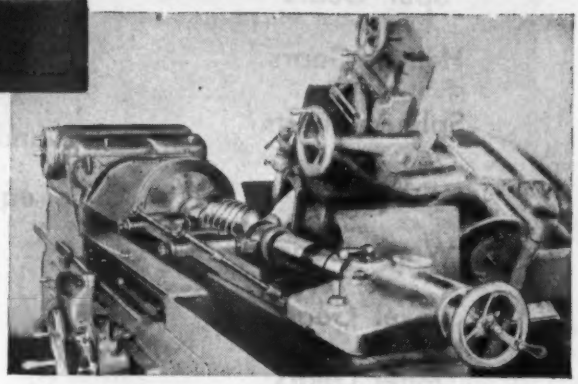
Designed for LONG LIFE



For a compact right angle drive that combines long life and trouble free operation get a Philadelphia Worm Gear Speed Reducer. In every way it will give service superior to open worm gearing which is exposed to dust and dirt, is poorly lubricated and subject to misalignment because of flimsy bearing supports.

In the design of Philadelphia Worm Gear Units factors causing wear have been eliminated. The tight, sturdy housing keeps out the dirt while providing a rigid support for the ball or roller bearings on which both worm and gear are mounted. The gear is made of special analysis chill cast bronze. The worm is case hardened alloy steel with threads precision ground in thread grinder as shown at right. An oil bath in which the worm revolves also provides lubrication for the gear and bearings.



Philadelphia Worm Gear Reducers are made in both horizontal and vertical types. For complete description of sizes, standard ratios and information on selection of the proper worm gear drive for your job, write on your business letterhead for Catalog No. 25.

Philadelphia GEAR WORKS INCORPORATED

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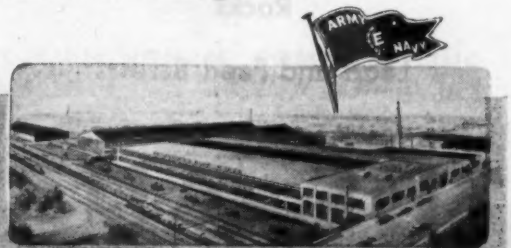
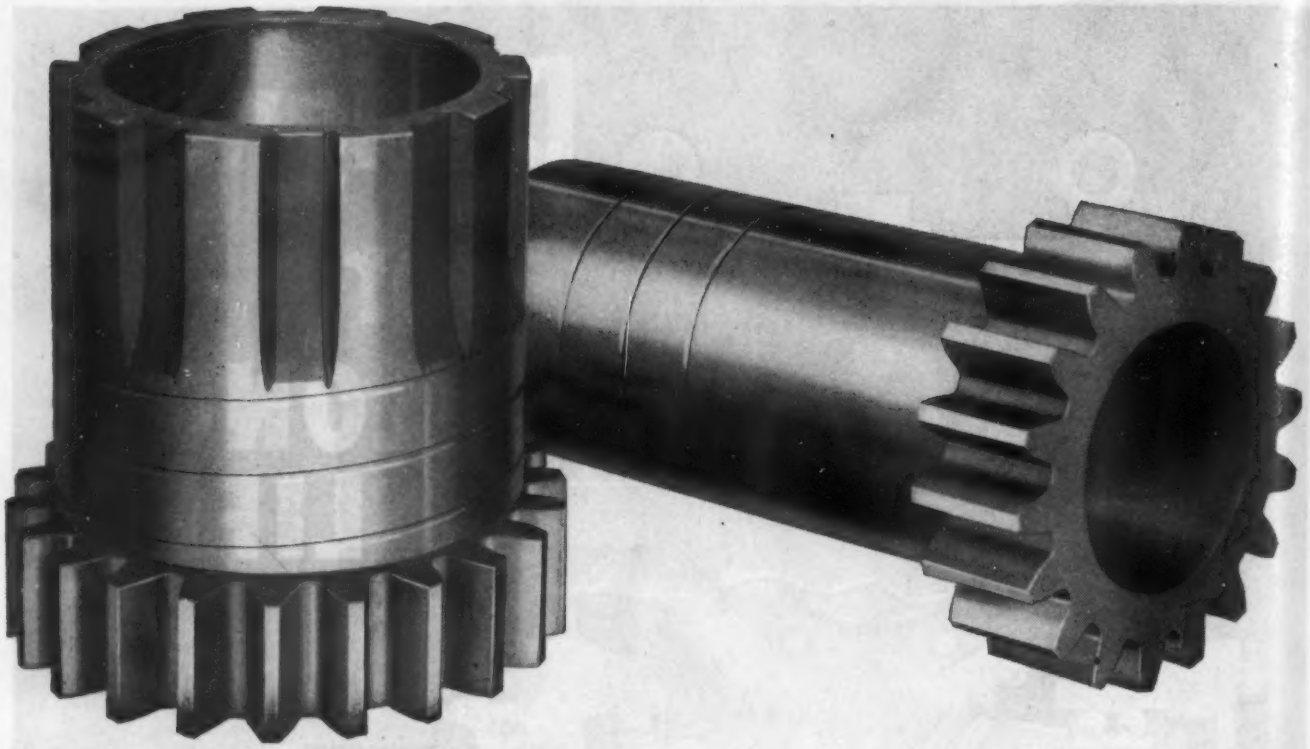


Industrial Gears and Speed Reducers
LimiTorque Valve Controls



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Worms

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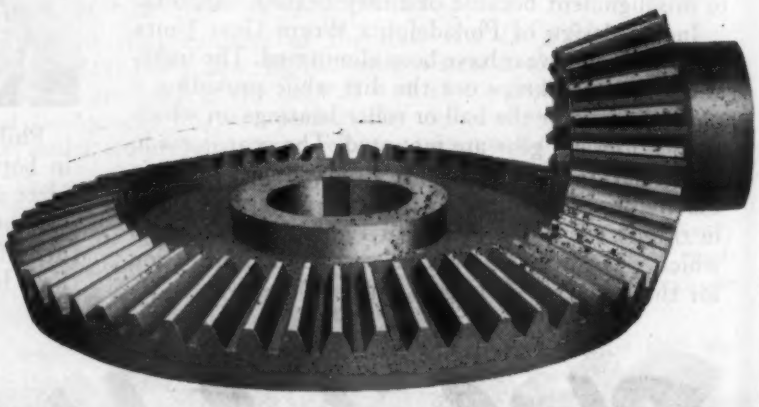

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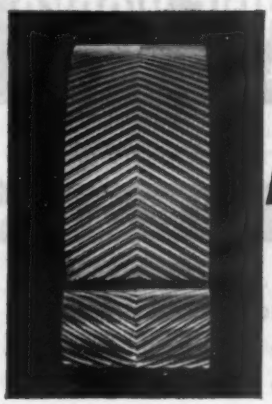
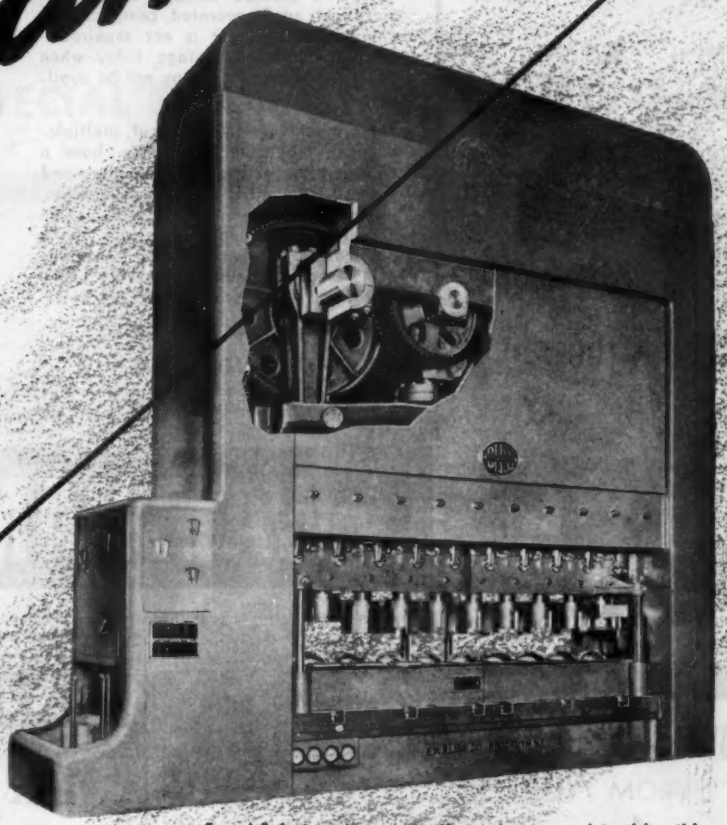
AND THE GEARS, TOO, ARE...

"Streamlined"



Because the two helices meet, instead of being separated by a center groove, the entire face width of Farrel-Sykes gears is put to work.



Farrel-Sykes continuous tooth gears are used to drive this modern press designed and built by the E. W. Bliss Co. of Brooklyn, N. Y. Totally enclosed and entirely automatic, the press produces an automobile hub cap in ten successive operations, from circular blank to finished article.

A GLANCE at the gears of this press shows that they are the famous Farrel-Sykes continuous tooth type—the *Gear with a Backbone.*

This means that there is no center groove separating the two helices, as is the case with some gears. Instead the teeth meet in sharp apices, which we call the *backbone* because it provides extra strength and higher load-carrying capacity in smaller space. In short, a more compact gear—"streamlined" in the sense of eliminating the unnecessary.

This is only one of the features of these gears. Precision cut by the Farrel-Sykes method of generation, their combined characteristics of overlap or interlacing of the teeth, gradual engagement and inclined line of pressure contribute to smooth, quiet operation and maintenance of correct tooth action throughout the life of the gears. The opposed helices balance and absorb axial thrust within the gear member, preventing harmful thrust loads with resultant stresses on other parts of the machine.

For the complete story of the *Gear with a Backbone* write for a copy of 80-page catalog No. 438. No cost, no obligation.

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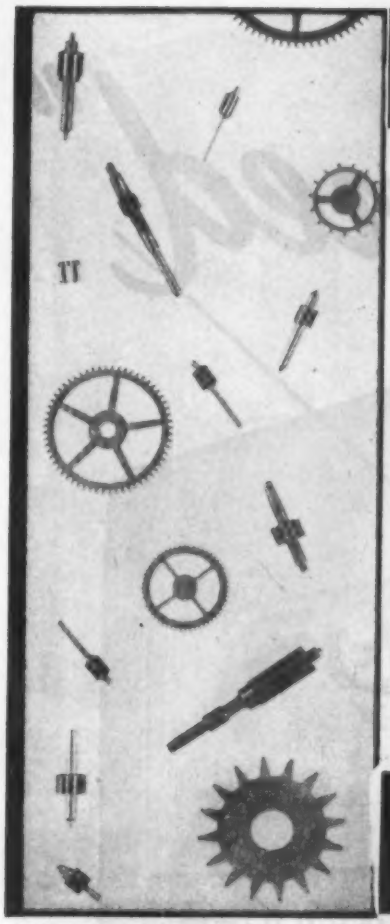

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PINION and GEAR CUTTERS . . . .

High production with maintained accuracy is assured through the use of these fast, easily operated, compact, machines. Skilled labor is not required—an outstanding advantage today when experienced operators may not be available.

These machines—in single-cut, multiple-cut and magazine feed types—have a capacity for producing small gears and pinions in quantity for use in watches, instruments, gages, fuses, etc. where precision is of utmost importance. Fully automatic operation is realized on magazine-feed machines. Cutters are available for Waltham and other machines.

Write at once for full details.

GEAR MACHINES

Pitch diameter, capacity 1½"
Strokes for work slide: .40", .65", 1.00", 1.25"

SPECIFICATIONS

PINION MACHINES

Diameter capacity (approx.)—½"
Coarsest pitch (about) 32 D.P.
Strokes of work slide for pinions .25" to .45"
Strokes of work slide for stacked gears .85" to 1"
Bench space (countershaft drive) 19" x 18"
Bench space (motor drive) 26" x 25"

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LOOK AT CINCINNATI GEARS
FROM *Any Angle...*
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That Cincinnati Gears reflect the mechanical productive skill and precise perfection that make possible their record in gear performance.

That they are accurate to the precise tolerance allowed by the engineer and designer . . . assuring production control and assembly efficiency.

That there are Cincinnati Gears for every purpose . . . made by master craftsmen long recognized as producers of *"Gears . . . Good Gears Only"*.

- SPUR
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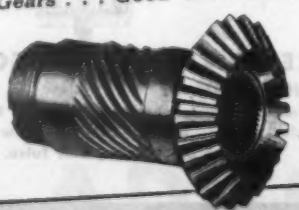

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"Gears . . . Good Gears Only"
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SMALL GEARS

SPURS • HELICALS • BEVELS
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WORM GEARING • THREAD GRINDING
(14 to 96 D. P.)

As manufacturers of high precision small gears for numerous vital controls used in this highly mechanized war, we are literally 'swamped'.

Therefore, under existing conditions, we are forced to minimize further commitments unless they have W.P.B. urgency support.

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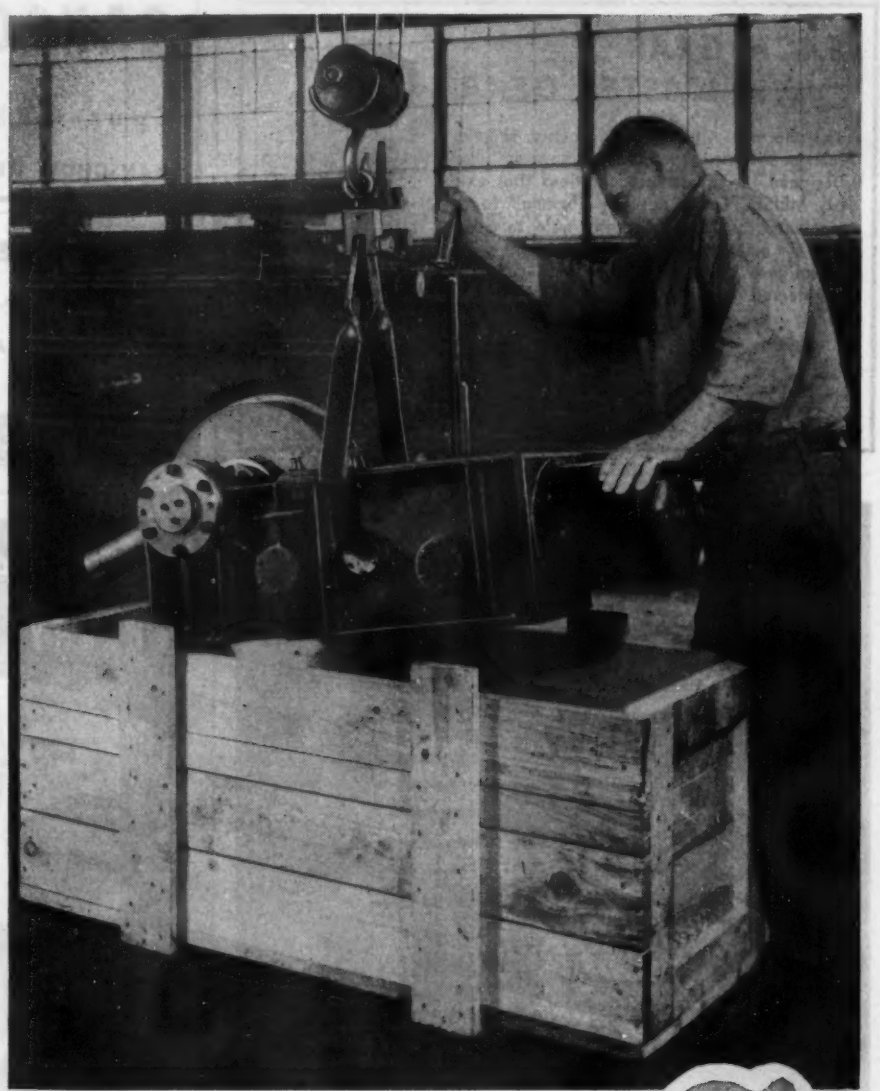
SIER-BATH PRECISION GEARS

GO INTO A SPECIAL SIER-BATH GEAR-DRIVEN UNIT



Whether you require gears or transmission equipment in which gears play an important part, send your specifications to SIER-BATH. In addition to our complete, modern facilities for producing precision gears of all types, we are equipped to build special gear-driven, high ratio speed reduction units to customers' requirements.

The unit shown here, built by SIER-BATH, is typical of the special class of work which we handle in our shop.

We invite your inquiries for precision gears from 2" to 52" diameter or for gear-driven equipment. *Prompt service is assured.*

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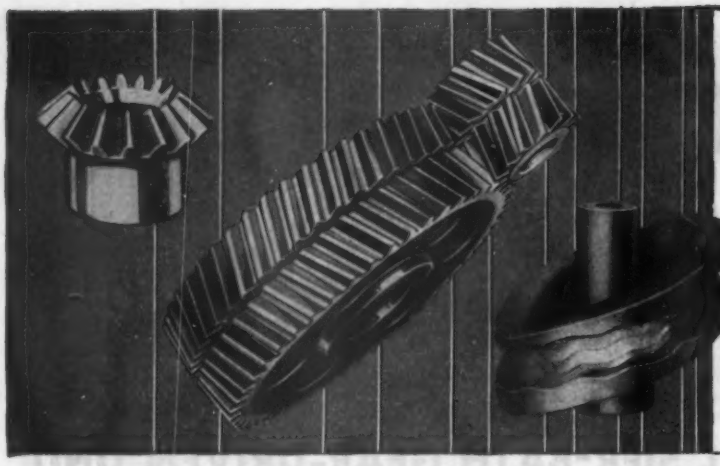
The Doorway to 38 years experience in making Precision Gears



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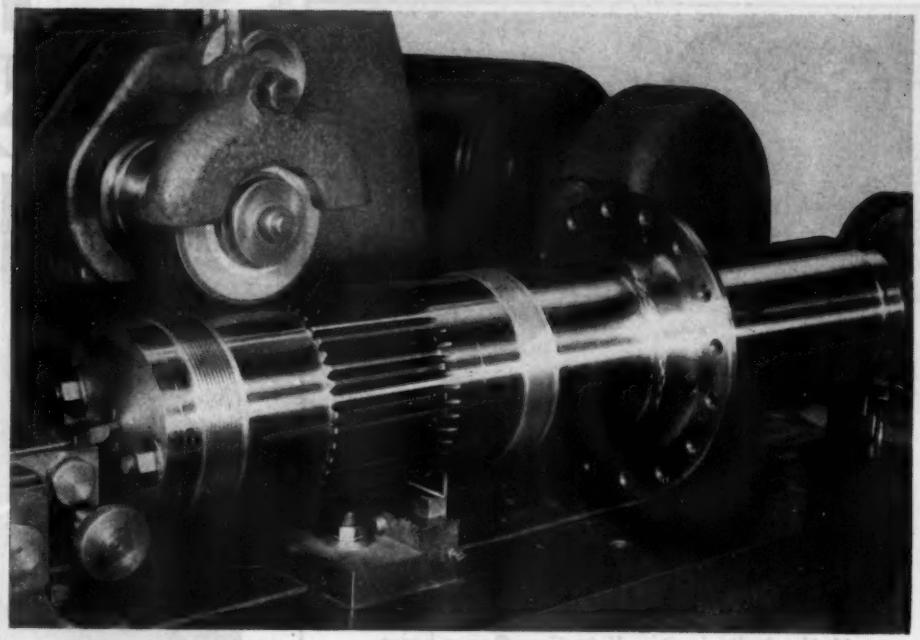

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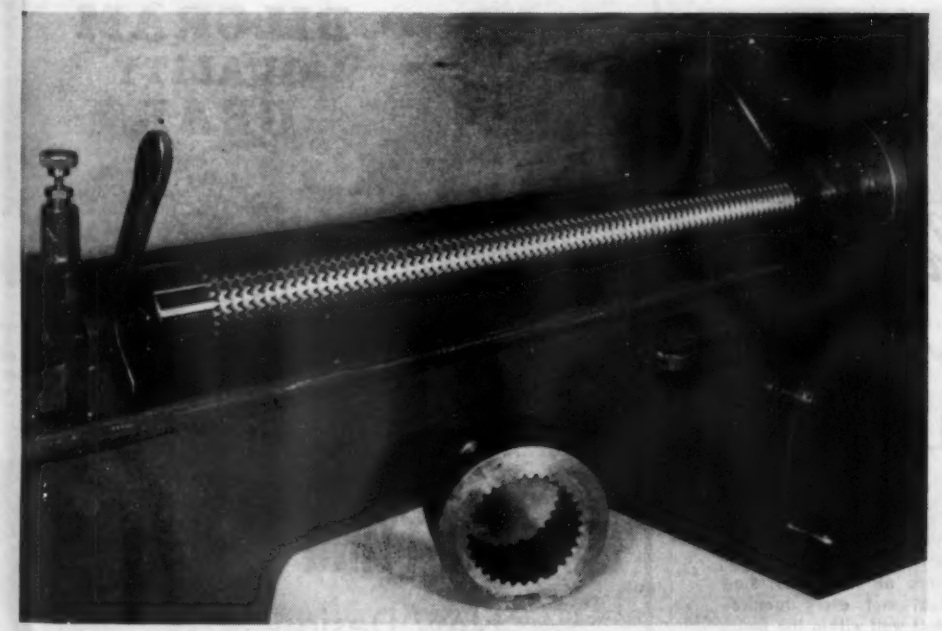

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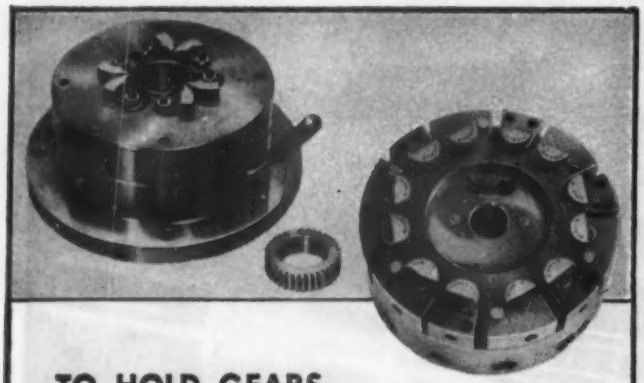

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We carry a complete stock of standard cut gears and can furnish special gears to your specifications.

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It's not only a big one but the specifications called for close tolerances for gears of this size. And Stahl met every requirement well within the limits called for.

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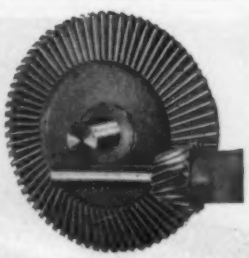

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- ★ HIGHER SPEED
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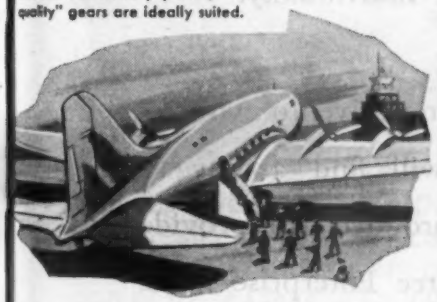
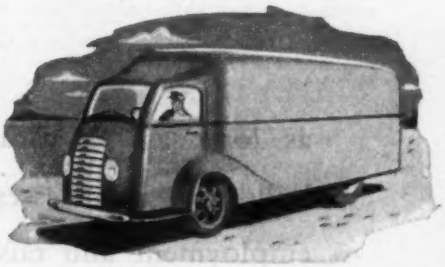
Better Power Transmission Through Better Gears

For actuators or other devices on commercial and military planes, "aircraft quality" gears are ideally suited.

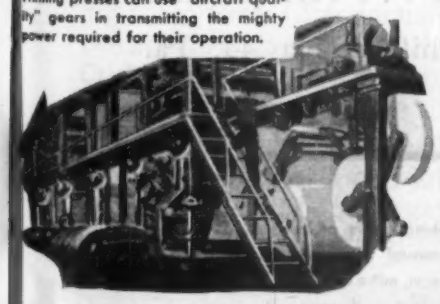


For airplane engines of every size, "aircraft quality" gears offer light weight, compact size, high speed.

For internal combustion engines, "aircraft quality" gears transmit high speeds with a reduction of size and weight.

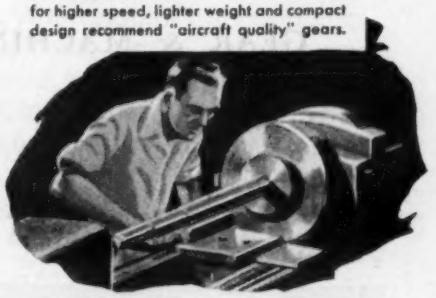


Printing presses can use "aircraft quality" gears in transmitting the mighty power required for their operation.

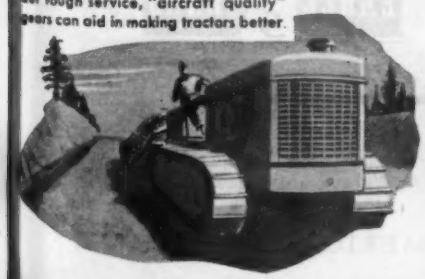


For the manufacturers of Diesel engines, "aircraft quality" gears can help solve many tough power transmission problems.

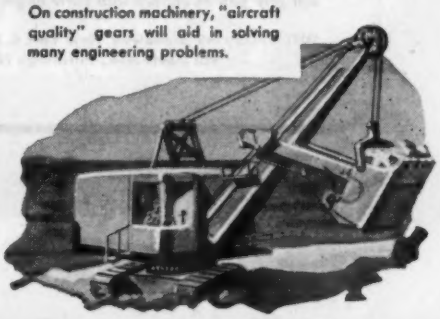
The demands of machine tool manufacturers for higher speed, lighter weight and compact design recommend "aircraft quality" gears.



Because of their ability to stand up under tough service, "aircraft quality" gears can aid in making tractors better.



On construction machinery, "aircraft quality" gears will aid in solving many engineering problems.



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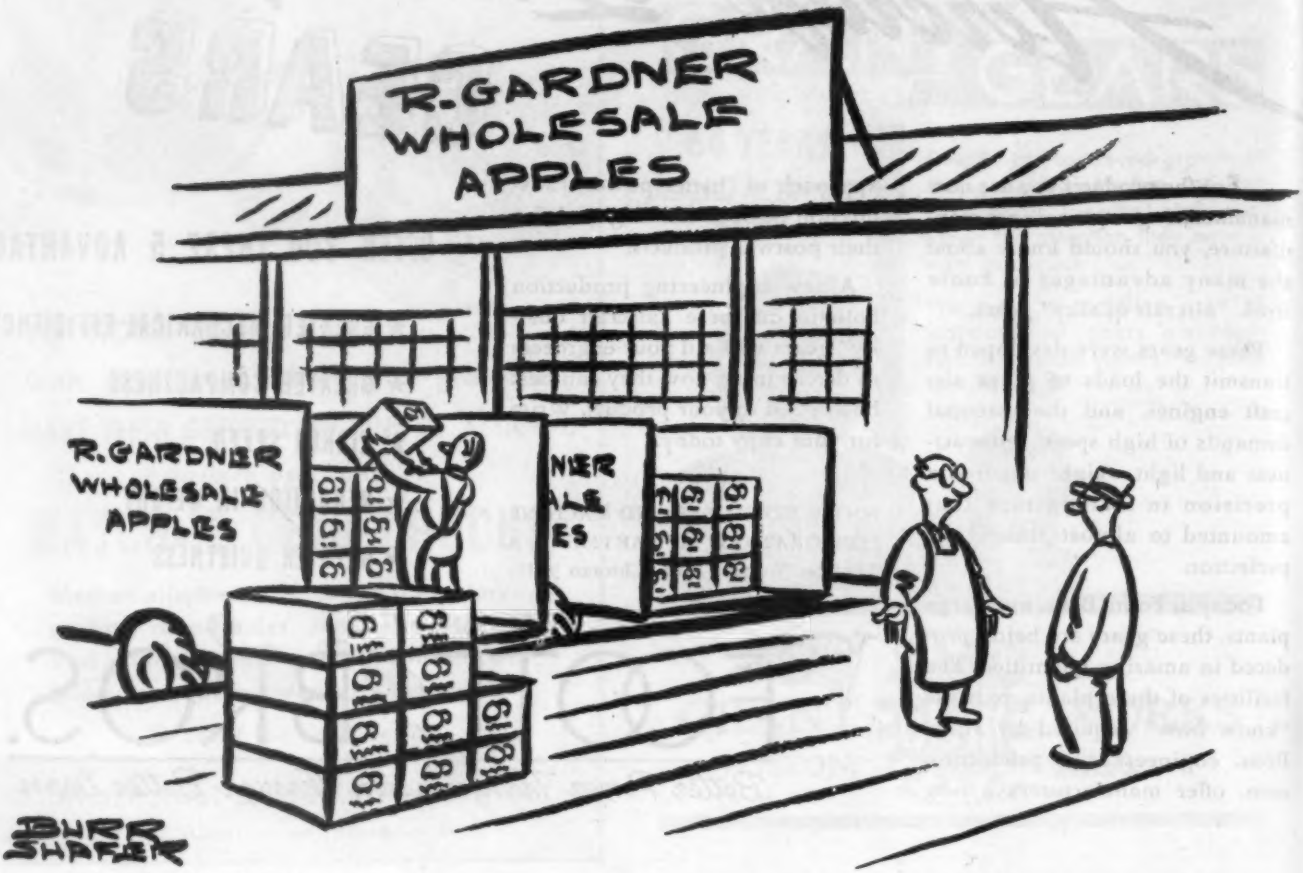

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* *Illustration, courtesy of The Saturday Review of Literature*

CLEARING HYDROPNEUMATIC DIE CUSHIONS Make Presses MORE VERSATILE

In these Clearing Cushions, hydraulic pressure cylinder and compressed air reservoir are combined in a single unit. Designed to accommodate high pressure, the Type FH handles high and low pressures equally well.

The cushion often eliminates enlarging press pits and foundations when equipping existing presses for heavier jobs. It is also the solution to occasional metal drawing problems where peculiar die design or other considerations make air-operated blankholders undesirable because of high pressure requirements.

Type FH Hydropneumatic Cushion

This schematic illustration reveals how the piston works against liquid instead of air in the Clearing Type FH Cushion. The liquid is admitted into the cushion by a check valve. During the drawing stroke the piston presses down on the liquid forcing it back into the container through an air-actuated relief valve. The air valve makes it possible to maintain an even drawing pressure at all times throughout the drawing stroke. Air-operated relief and check valve works automatically; all the press operator need do is set the relief valve for the required drawing pressure.

Clearing Hydropneumatic Die Cushions bring you greater capacity per cubic foot of space required than do ordinary cushions. Installation of these Clearing Cushions often permits production of a wider variety of work on existing equipment. Their compact design makes it possible to install Clearing Hydropneumatic Die Cushions where a press bed or foundation does not permit installation of ordinary air cushions.

Hydropneumatic Die Cushions are typical products of the skill and knowledge of press problems gained by our organization in designing and building Clearing Presses. The value of this approach to the production of press accessories is evident in the details above that describe these cushions.

It will pay you to know all about Clearing Cushions and what they can do for your particular operations. When inquiring about Hydropneumatic Die Cushions, please include press manufacturer's name, model number, capacity and stroke; dimensions of bed opening and bed area. Write us today for complete and interesting information on cushions built by press builders. Clearing Machine Corporation, 6499 West 65th Street, Chicago 38, Illinois.

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Because most of our work is beyond what other shops can do, customers for Presteel stampings are located in every section of the country. Our nearest representative will be glad to discuss drawing or forming problems with your engineers and the extensive experience of the Presteel engineering staff is always at your disposal.

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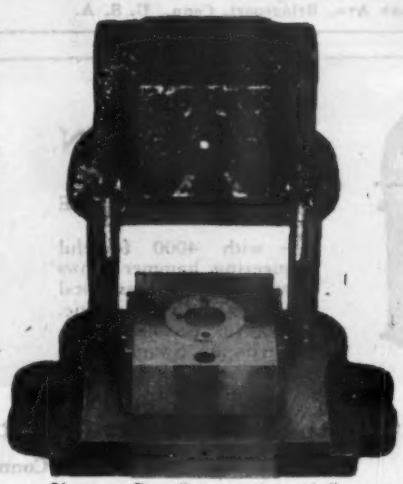
Purchased for War Production can be used for . . . POST-WAR EQUIPMENT!



Made in Five Sizes: ¾" — 1½" — 2½" — 4" — 8".

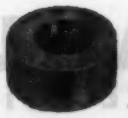
Each Hovis Universal Master Washer Die is made on an all-steel precision standard die set which comes complete with stock gauges and stops. The Master Dies themselves can be used after reconversion.

THE MASTER DIES THEMSELVES DO NOT BECOME OBSOLETE

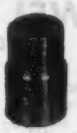
THE 5 EASILY REMOVABLE PARTS
are all the TOOLING required to make a new size washer

Once having made your investment in Master Dies, the 5 small interchangeable parts are all you need to buy to make any size washer for your new product. Send coupon for illustrated circular explaining in detail the simplicity and economy of this method.

DETAIL NO. 6—Piercing Punch for inside diameter of washer.



DETAIL NO. 9—Button Die for blanking outside diameter of washer.



DETAIL NO. 13 — Compound Blank, Punch and Pierce Die.

DETAIL NO. 8—Knockout, to remove washer from die.

DETAIL NO. 19—Stripper Bushing to strip stock from compound.

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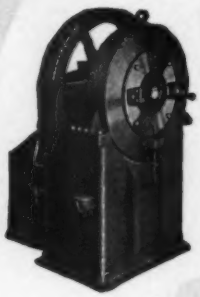

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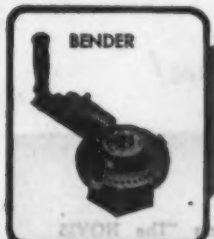

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The DI-ACRO System of METAL DUPLICATING WITHOUT DIES has proven its adaptability in making parts just as accurately as can be done with dies, to a tolerance of .001" in all duplicated work. The delay of waiting for dies is avoided, deliveries speeded up. *Write for Catalog.*

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BIG FORGINGS "GO STRAIGHT" IN A HURRY WHEN THIS ELMES PUTS ON THE PRESSURE

STRAIGHTENING PRESS MODEL No. 5990
Capacity 660 tons. All steel, self-contained, with long bed and power-traveling table.

Bars, quill shafts, piston rods, and other forgings too numerous to list, come from annealing furnaces to this 660-ton, all-steel Elmes straightening press at Plant No. 1 of A. Finkl & Sons Co., Chicago, nationally known for quality forgings.

Sizes range up to 12-in. diameter, yet the Elmes press with its 17-ft. long bed and traveling table can be served conveniently at either end from above, and Elmes positive hydraulic pressure under accurate control can be applied in just the right amounts and at just the right places to remove heat-treatment distortion surely and quickly.

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The independently powered traveling table is equipped with heavy adjustable V-blocks and with air-actuated roller lifts which enable the operator to revolve the part easily both for visual inspection and for straightening to forging tolerances. Fine precision is unnecessary here, but minor changes in control can adapt the press for extremely exacting service.

A. R. Lane, Works Manager, says they have had no trouble whatever, and that during the two and one-half years this straightening press has been on the job it has done good work quickly and dependably. A. Finkl & Sons Co. is now exclusively on war production, a large part for the Navy, but in normal times their four Chicago plants are kept busy producing a general run of die blocks and other heavy forgings.

You too can put your pressing problems up to Elmes. Nearly a century of specialization is your assurance of expert recommendations and performance at its best. Elmes Engineering Works of American Steel Foundries, 1001-1013 Fulton St., Chicago 7. Also manufactured in Canada.

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Elmes hydraulic presses serve modern industry in many ways, in many places. Forcing, forming, die sinking, extruding, straightening, bending, plastics molding, and many other operations are routine on Elmes presses because Elmes equipment is thoroughly dependable and Elmes simplified controls are fast, accurate, instantly responsive.

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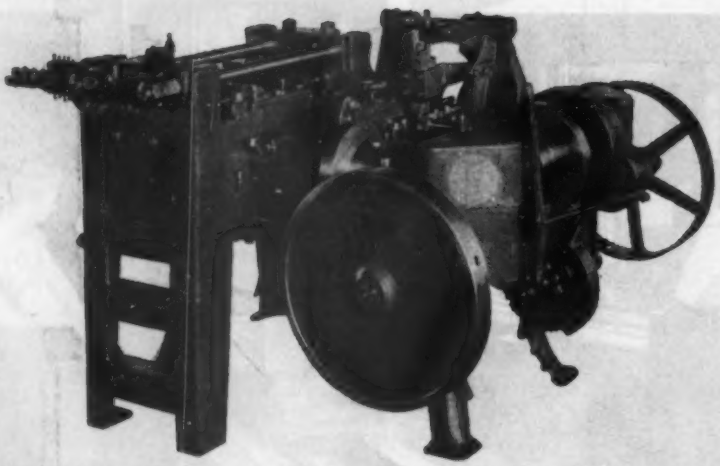
HANDLE YOUR SWAGING, STAMPING, PIERCING, BLANKING and FORMING of COILED METAL

ON THE **NEW NILSON AUTOMATIC PRESS and FOUR SLIDE MACHINES**



These Nilson machines are built in two sizes and are fully described in Bulletin No. 90, available promptly on request.

. . . for fast, heavy duty work

An outstanding feature of these combination power press and four slide machines is the powerful, silent action of the main press slide which is operated by crank motion through toggle or knuckle joints. Overhead stay rods contribute to the tremendous strength and rigidity of this machine.

Other features include simple and easy changing of accessible and removable die set, open construction of forming slides and tool adjustments made without interference.

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Nilson's more than 30-year experience in the design, development and manufacture of special, high production automatic machinery is available to assist you in producing any special machines you may require. Consult our engineers and be assured of a comprehensive service.

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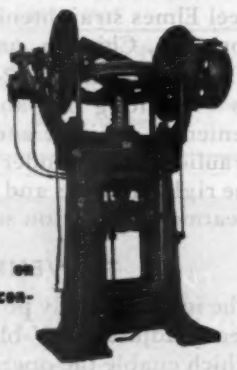
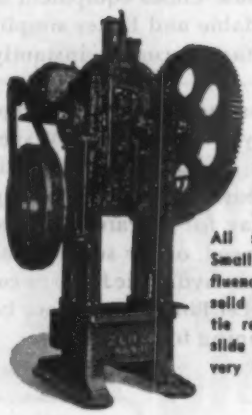


PATENT PERCUSSION POWER PRESSES

For hot pressing brass and non-ferrous metals, cold pressing steel parts, and press forging heaviest steel parts. Excellent for coining, sizing, or striking.

Uniform blow—no over pressure on dies. Larger sizes have pneumatic control.



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For all heavy blanking and forming work—a press that will stand up.

All stresses are taken centrally. Small elastic deflections do not influence alignment of tools. Built with solid frame, or built up with special tie rods. Wedge adjustment for the slide permits a more limited but very fine adjustment.

More than 40 years of specialized experience is responsible for this great line of presses. Lower operating, labor and maintenance costs are bought in every Z & H press.

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Most suitable press for general stamping work.

Heavy frame construction, with a strong, simple, durable, non-repeating clutch. Slide guided in long V-shaped jibs—carefully fitted. Ball joint pitman, adjustable for wear. Crankshaft designed for maximum pressure without springing. Reclines to 40°. Full safety equipment. Easy to operate.

ZEH & HAHNEMANN CO.

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Available in thicknesses of ¼ to 2 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For complete details about this modern money-saver, please fill out and mail coupon.

PRODUCTION PIN-UPS. *Look for the next issue of "Production Pin-Ups" on your plant bulletin board. They give you pictures and explanations of the latest uses of Masonite Die Stock.*

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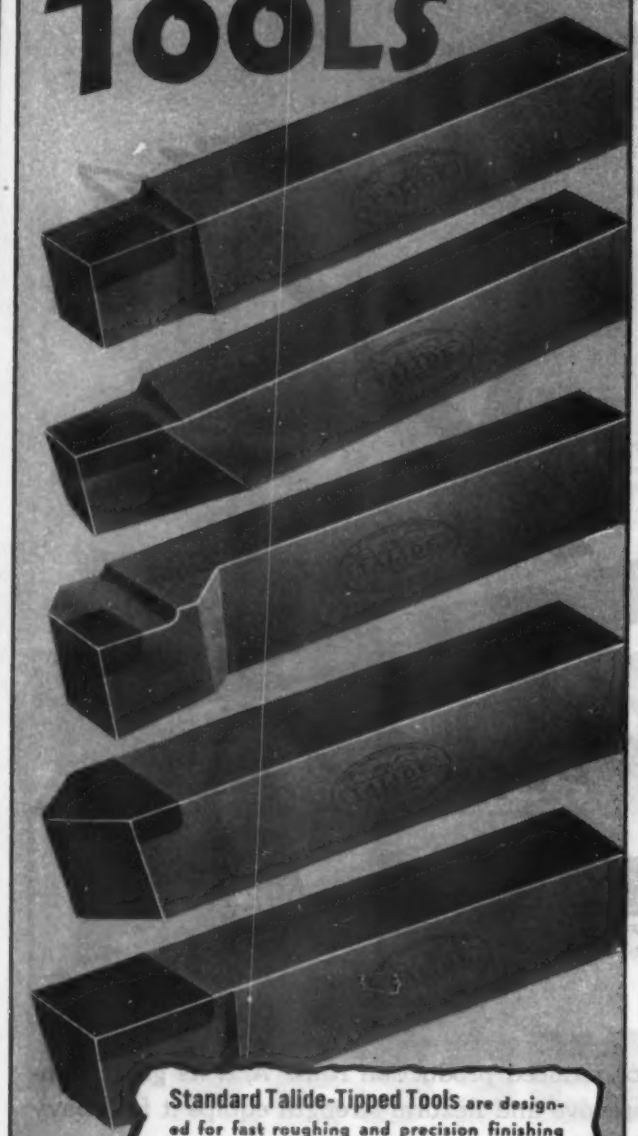
TALIDE-TIPPED TOOLS



Standard Talide-Tipped Tools are designed for fast roughing and precision finishing operations on all types of steels, cast iron and non-ferrous metals. Available in both Tungsten Carbide and Tungsten-Titanium Carbide compositions, Talide Tools give longer run, higher speed performances on all kinds of machining operations including turning, boring and facing. Send for catalog No. 43-T.

TIPPED WITH TALIDE TUNGSTEN CARBIDE

METAL CARBIDES CORPORATION YOUNGSTOWN, OHIO

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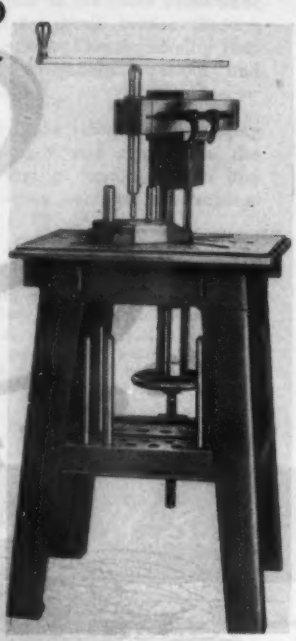
TUNGSTEN CARBIDE TOOLS · DIES · WEAR PARTS

2 PRODUCTO TOOLS

essential to faster, better work in Tool and Die Shops.

1. THE PRODUCTO

Universal Hand Tapper



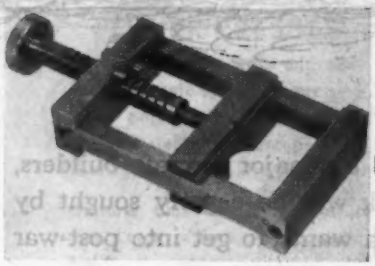
This recently developed machine is a "natural" for tool and die shops because it absolutely insures accurately tapped holes and prevents tap breakage. No setting up is required and work is handled quickly and easily.

Holes can be tapped or reamed in any position on the table. Two sizes of spindles provide for a range of tap sizes from No. 5 to 1" diameter.

Write for literature giving full details.

2. PRODUCTO *Precision Tool*

Room VISE



Handy and light in weight — with large, opening capacity. A precision tool for jig borers, surface grinders and accurate tool room purposes. All parts are hardened, with surfaces and jaws ground at right angles and parallel. Step jaws permit tight gripping for drilling holes close to edge of work without the use of parallels. One jaw has a Vee for holding round parts or punches. Quick acting grooved spindle permits fast adjustment. Locking latch engages groove in spindle and turn of Knurled wheel operates telescoping screw which tightens jaw.

Length 9½", width 5½", height 2"; maximum opening (step jaw) 6".

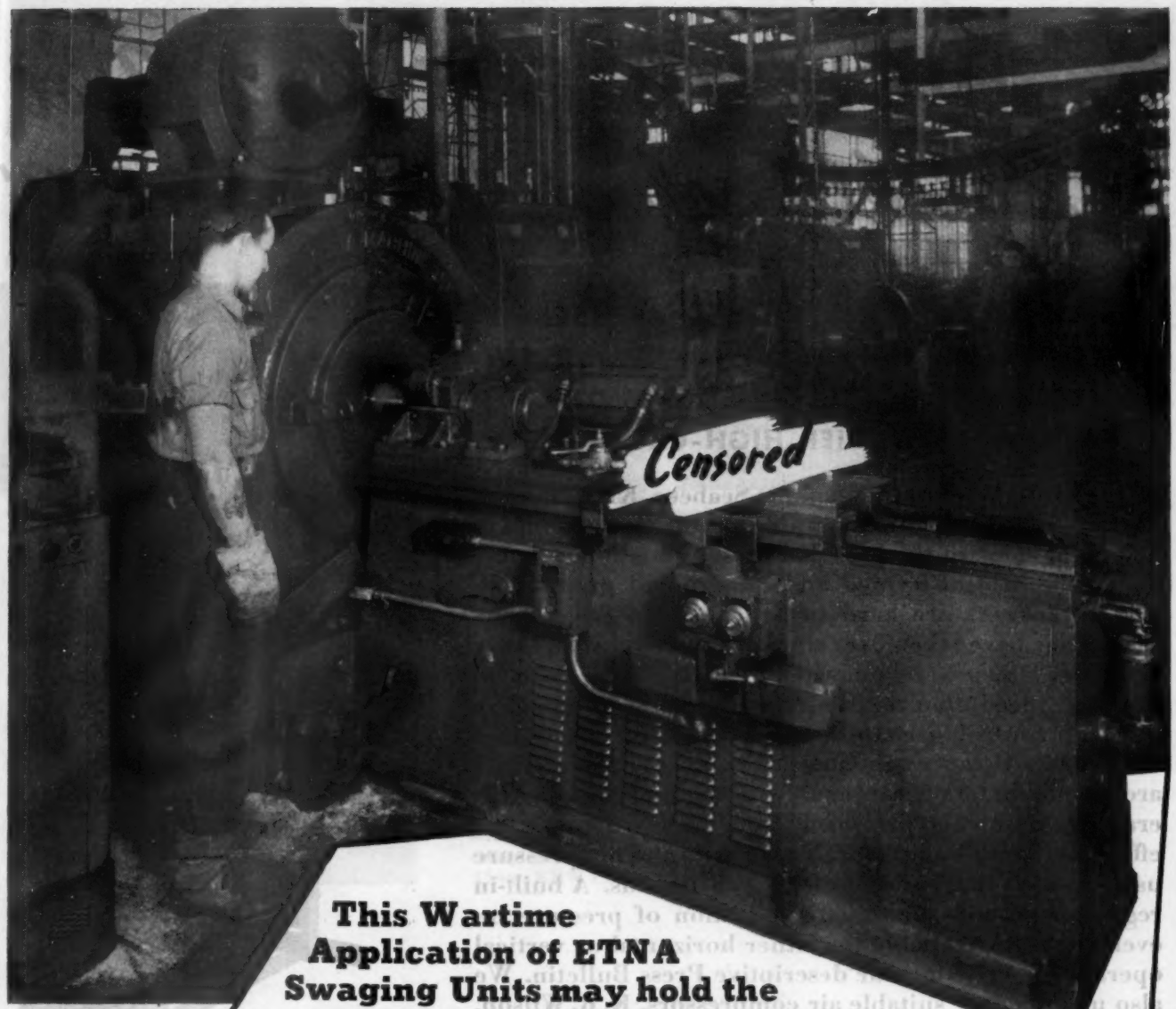
Send for further details

The

PRODUCTO MACHINE COMPANY

940 HOUSATONIC AVE. BRIDGEPORT, CONN.

3037 MEDBURY DETROIT, MICH.



This Wartime Application of ETNA Swaging Units may hold the answer to your Postwar production-machining and handling problems!

Clearly demonstrated here are the benefits of fewer machining operations, reduced production time and labor costs and elimination of metal waste that you may expect from an ETNA Swaging Machine installation in your plant.

The ETNA Unit shown here is, in the words of its owner, "giving excellent performance" in producing rocket bomb casings. The machine is automatic in operation . . . each casing swaged after first being heated in the furnace at the left. Production figures obviously cannot be given but we can assure you that the rate is a definite recommendation for these Swaging Units.

The advantages of Swaging as illustrated here are worthy of your special consideration from a standpoint of present and future needs. Let ETNA help you with your postwar thinking. Write explaining your operations . . . we'll be glad to render engineering assistance on any tapering, reducing or sizing operations.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING

"Ask ETNA about Swaging"

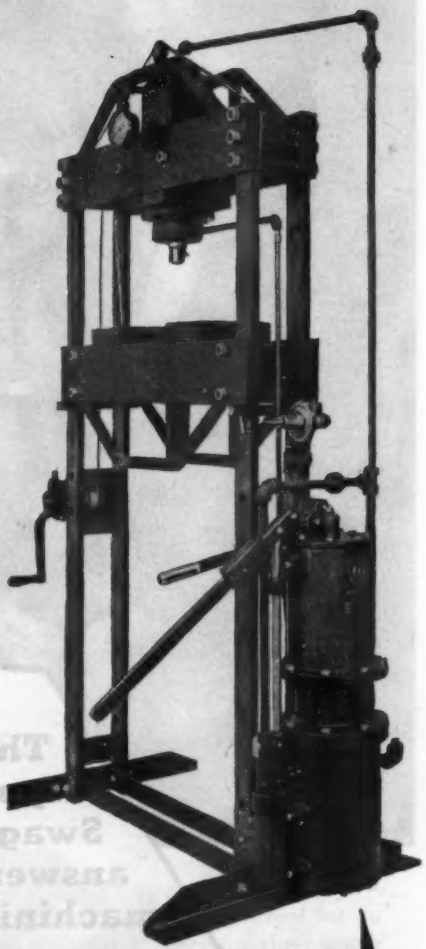
The ETNA Machine Company

3400 MAPLEWOOD AVENUE

TOLEDO 10, OHIO

. . . HIGH OUTPUT *Low Cost* *Quickly solve* "TIGHT SPOT"

VERSATILE KRW HYDRAULIC PRESSES . . . EQUIPPED WITH PATENTED KRW SPEEDI-BOOSTER . . . USING INEXPENSIVE DIES, DO THE WORK OF HEAVIER HIGH-COST PRESSES



● Like the motto of our famous Seabees, KRW Presses answer "Can Do" to innumerable production problems. A look at some of the jobs that these presses have handled in the heat of trebled and quadrupled production, and the answers are hard to believe. In a great many cases, they have taken over the work of expensive, heavy machines which were unavailable at the time. Heart of the new Speedi-Booster Hydraulic Press is its sensitive fingertip control mechanism which instantly governs ram movement. Using easily made dies, these KRW Presses are adaptable to a great many bending and pressing operations requiring pressures from 5 to 75 tons. The effective hydraulic pressure varies with the air pressure used . . . which ranges from 80 to 225 pounds. A built-in regulator permits the exact duplication of pressure on every stroke. Available for either horizontal or vertical operation. Write for our descriptive Press Bulletin. We also manufacture suitable air compressors. K. R. Wilson, 10 Lock Street, Buffalo 2, New York.

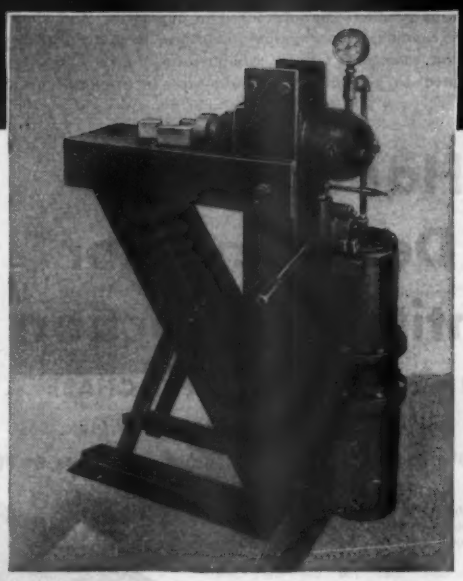
THE KRW *Speedi-Booster*

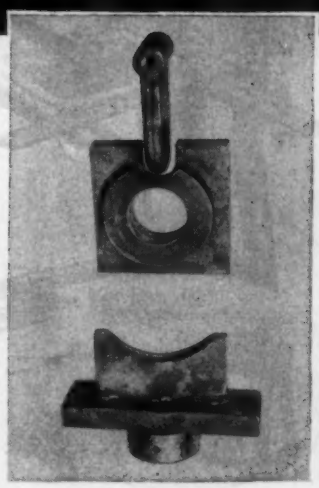
THE REASON WHY KRW PRESSES ARE FAST AND ACCURATE . . . The KRW Speedi-Booster eliminates the need for the conventional Capstan wheel or pumping lever. Instead, it uses compressed air as the motive power operating the ram. Because the compressed air is controllable through a pressure regulator, any desired tonnage pressure at the ram can be obtained and duplicated. Ram movement (up, down or stop) is instantly controlled with the slightest fingertip movement of the lever.

KRW PRESSES

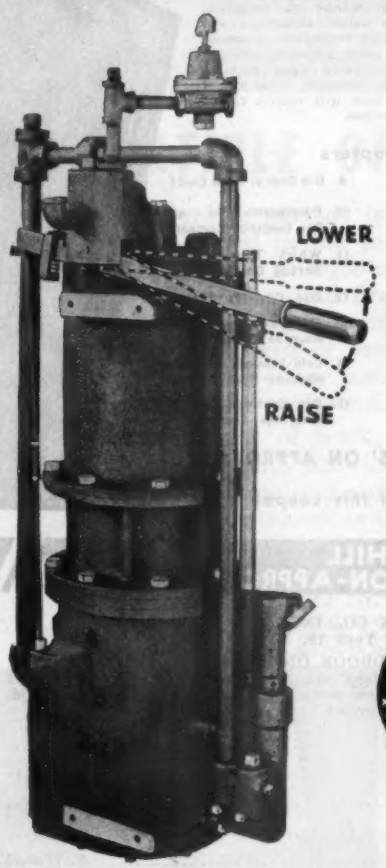
production problems

THIS MACHINE . . . MAKES THIS . . . WITH THESE SIMPLE DIES





With the simple dies shown, quickly made from stock steel, this 6-inch ring is made with but four feeding passes into the lower die. Before the radius is completed, the shackle is inserted into the die notch, permitting the ring to "thread the eye" of the shackle. Closing ring by welding completes operation. EQUIPMENT: 25-ton KRW Press.



AVAILABLE TONNAGE PRESSURES

25 - 50 - 60 TON PRESSES

AIR PRESSURE	7" AIR CYLINDER		9" AIR CYLINDER	
100 TO 200 POUNDS	2" Oil Cylinder	1¾" Oil Cylinder	2" Oil Cylinder	1¾" Oil Cylinder
	10 to 22 Tons	14 to 29 Tons	17 to 35 Tons	23 to 47 Tons

75 TON PRESS

AIR PRESSURE	9" AIR CYLINDER	
100 TO 200 POUNDS	2" Oil Cylinder	1¾" Oil Cylinder
	25 to 51 Tons	33 to 68 Tons

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KRW HYDRAULIC PRESS CATALOG

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famco Announces

A BRAND NEW LINE OF FOOT-POWERED SQUARING SHEARS

MADE IN FIVE SIZES

Famco proudly presents a new, highly efficient, foot-powered squaring shear . . . the result of many months of designing, engineering and testing . . . available in 22", 30", 36", 42" and 52" cutting widths.

If you need a squaring shear, it will pay you to investigate the latest thing on the market. Famco has developed a new, low cost, foot-operated (motorless) machine that's extremely powerful . . . will cut up to 18 gauge mild steel.

This machine is ruggedly built of semi-steel, accurately machined. The cross-head is reinforced with a steel tie rod for proper knife alignment and accurate shearing. Compressing springs are encased to practically eliminate their breakage. Knives have tool steel cutting edges.

Fast, accurate depth setting is accomplished with back gauges moved on heavy support rods by means of graduated racks and pinions. All models are equipped with front, back and side gauges. The "hold-down" attachment is furnished with the 36", 42" and 52" sizes.

Write for information and prices on this inexpensive, efficient new line of shearing machines

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Famco builds 32 models of bench and floor type arbor presses that deliver from ½ to 15 tons pressure.

Famco Foot Presses are made in 10 sizes, for bench or stand mounting . . . save cost of power presses.

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ARBOR PRESSES • FOOT PRESSES • SQUARING SHEARS

TO HELP YOU

in designing basic parts for quantity production

Written by seven authorities, this book gives a completely practical treatment of the design of basic parts for quantity production by die casting, sand casting, screw machine, stamping, die forging, hot and cold heading and plastic molding. Along with full explanations of the various high-production processes and sound pointers on designing for each one of the processes, the book gives many specific rules, amply illustrated to show their practical applications, for designing products that will lend themselves to rapid and economical mass production. In Part II various types of products manufactured in quantities at moderate or minimum cost are compared, one against the other, in many instances with actual production costs and tabular comparisons, to show the type of design best adapted to economical manufacture in various specific instances.

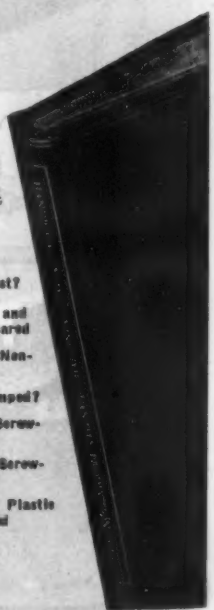
Handbook on Designing for Quantity Production

Prepared and Edited by HERBERT CHASE

Associate Editor of *Aviation*, assigned to *Wings*.

517 pages, 5½ x 8½, 351 illustrations, 54 tables and charts, $5.00

Now you can avoid the necessity for redesign. Not only will you be able to form the original design quicker, but now you can be sure to make it thoroughly useful for more economical production in large quantities. We ask that you use the book once, for an invaluable design pointer on materials, for exact design considerations—actual advantages and drawbacks—for the various high-production processes, or for one of the hundreds of newly advanced, straightforward rules to follow in designing basic parts for the different quantity production processes. Use it once, and then decide whether this book will remain right at your fingertips for instant reference.



Chapters

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2. Design of Sand Castings for Quantity Production
3. Design of Screw Machine Products
4. Design of Stampings
5. Design of Die Forged Parts for Quantity Production
6. Notes on and Accomplishments in Hot Heading
7. Notes on the Design of Cold-headed Parts
8. Design of Plastic Moldings for Economical Quantity Production
9. Die Cast or Sand Cast?
10. Permanent-mold and Die Castings Compared
11. Which Type of Non-ferrous Casting?
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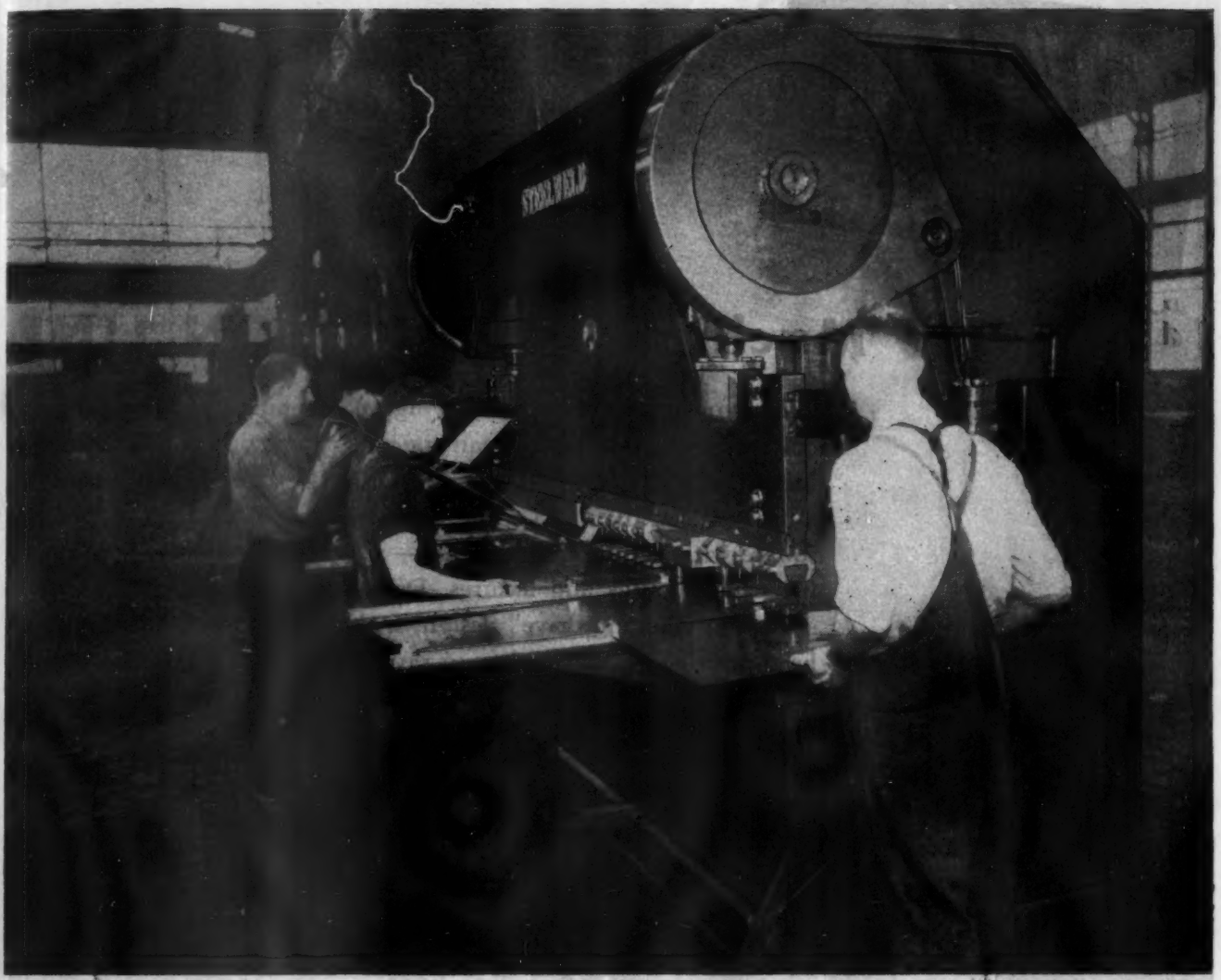

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Considerable savings in time and money can be effected in the production of many parts by using a multiple-operation set-up on a Cleveland Steelweld Press. Thus at every stroke of the machine a different operation is performed on each of several parts. This is continued until every piece has been taken through all dies on the machine.

Various types of work, such as bending, forming, blanking, drawing, rubber-forming and multiple-punching are readily performed on Cleveland Steelwelds in this manner.

The four men working on the press illustrated perform eight operations on a plate as it travels through the various dies. The end man, in foreground, handles two plates in which holes are pierced, first at the center and then at one end. The second man multiple-punches both ends of each plate. The last two men perform two bending operations on both ends.

For many types of products Cleveland Steelwelds cut costs, improve quality and appearance. Why not consider their possibilities on your work?

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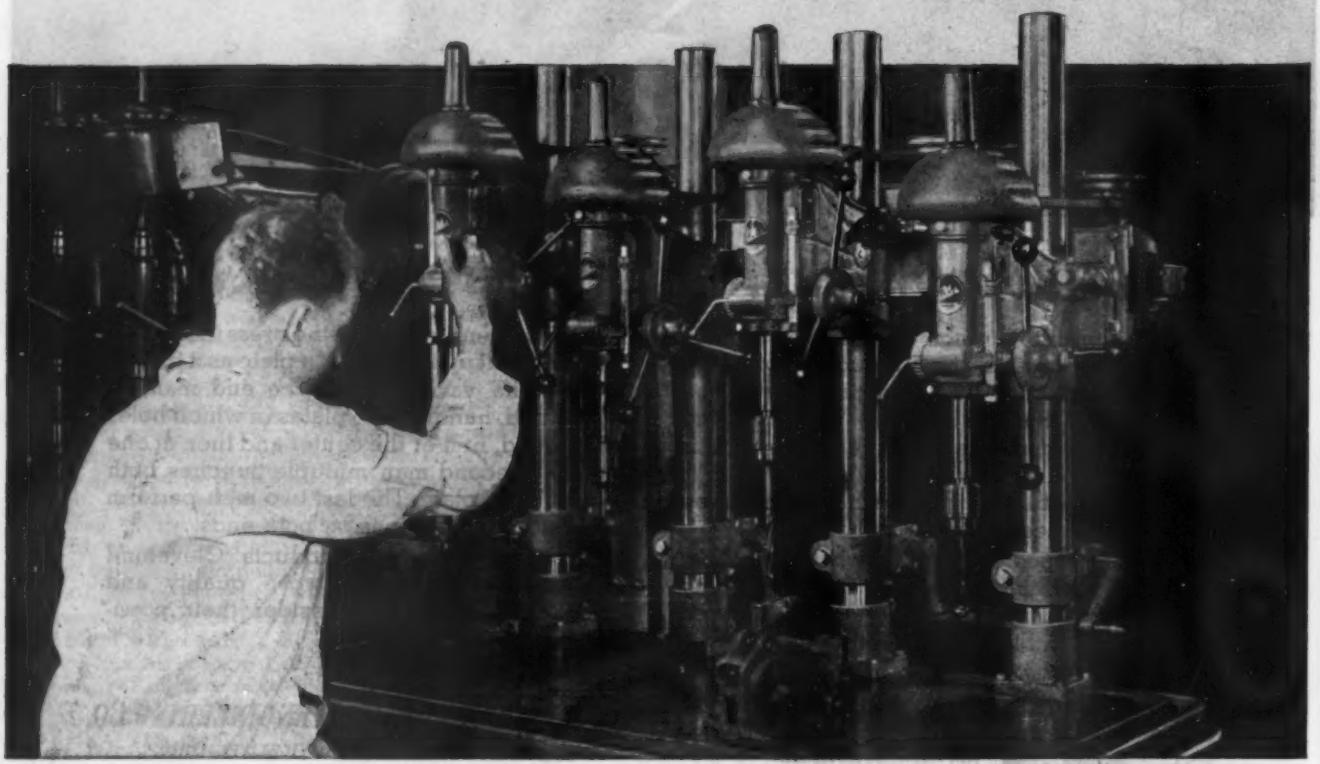
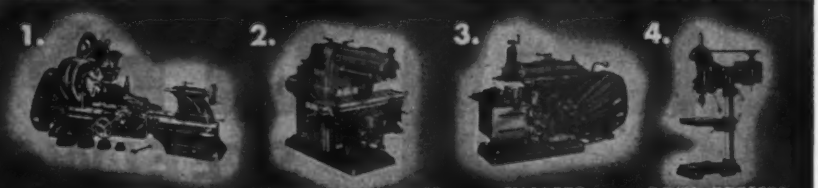


Atlas 4 TOOL TEAM FOR SMALL-PARTS MACHINING



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MACHINE TOOL CO.
SPRINGFIELD 7, MASS.

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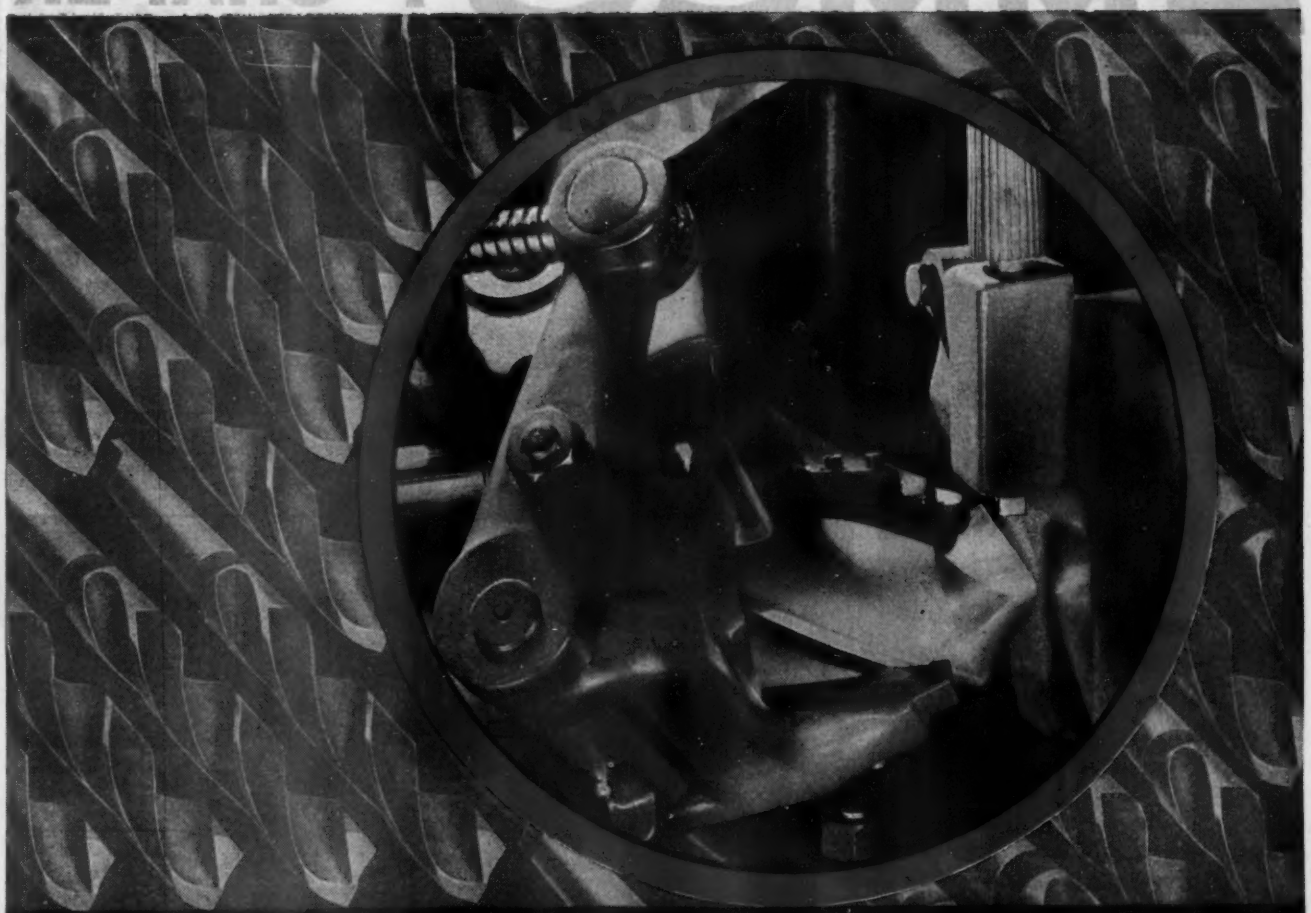

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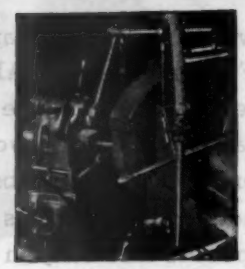

SELLERS NO. 4-T TOOL GRINDER. A fully universal grinder for single point tools of every shape—from ¼" sq. to 1½" x 2".

IF fast, accurate drilling is important to your production you will find the answer in a

SELLERS DRILL GRINDER

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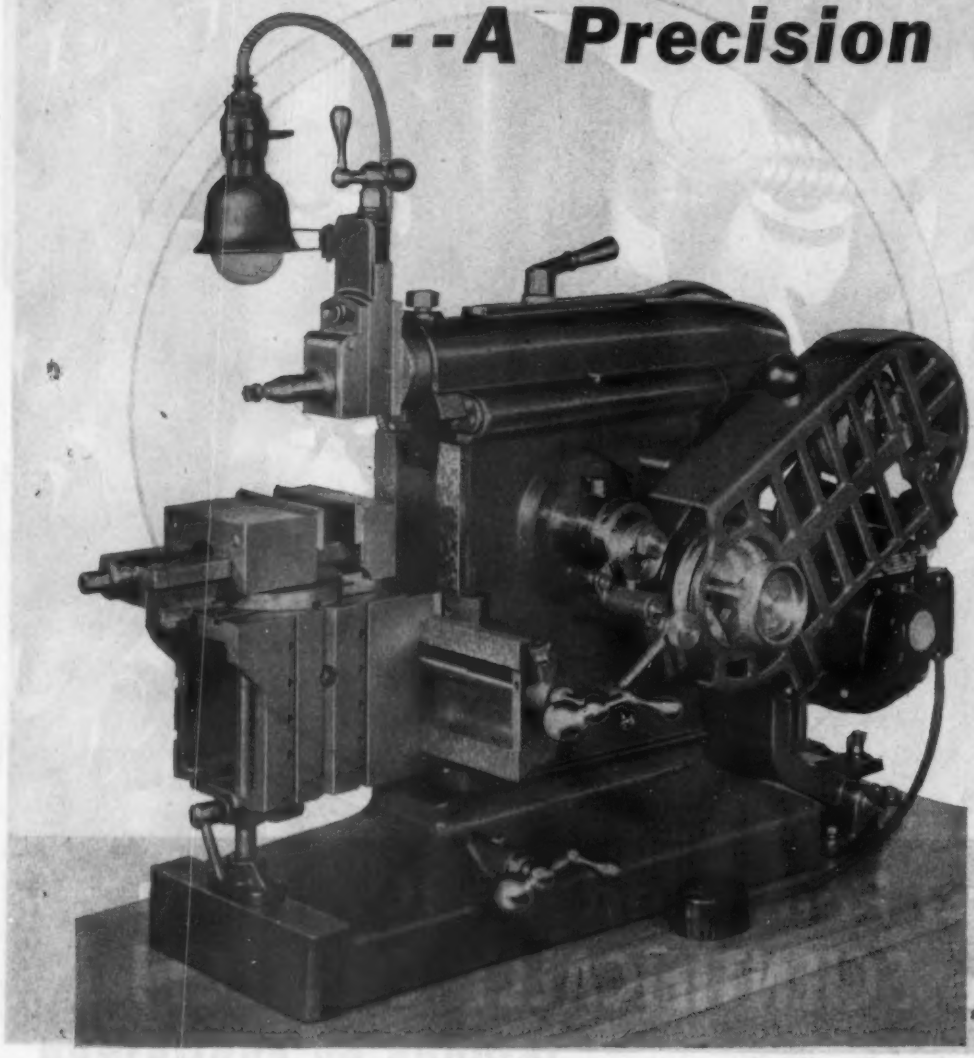
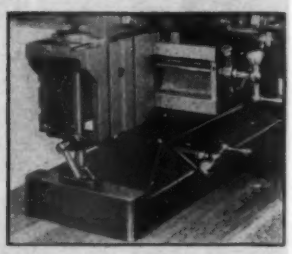
SELLERS PRECISION MACHINE TOOLS SINCE 1848

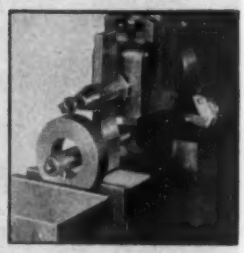
AMMCO 7" SHAPER

--A Precision Machine





★ Has "VEE" Type Ways, comparable to those of large, expensive shapers.



★ Handles a wide variety of work.

★ Portable Model is mounted on maple cabinet.

You'll be amazed and agreeably pleased with the precision, speed and economy with which you can turn out jobs on an AMMCO SHAPER . . . Users tell us "it's the finest made."

It is small in size, but it is mighty in efficiency and precision.

On jobs requiring a stroke of 7" or less, the AMMCO 7" SHAPER will enable you to save a lot of time and expense on a set-up such as would be required on larger shapers . . . You also have an opportunity to effect considerable savings in capital investment . . . savings in electrical power consumption and savings in floor space . . . Furthermore, the AMMCO will enable you to get away from the cost of operating a big shaper on small work, and will leave big shapers open for big jobs.

Construction incorporates many features you would expect to find only in larger, more expensive machines . . . For example: WAYS of ram, tool head, and front face of the main frame are of the "VEE" type, hand scraped to insure accuracy and long life . . . Available for bench installation, or as a portable unit.

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Sawing Tool Steel

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Structural Steel

Round Tubing

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A Wells is a handy tool to have around where there are miscellaneous sawing requirements. In the first place it will cut most any metal of any shape you can get into the saw—and it is simple to move about on casters or a dolly. It cuts accurately and efficiently . . . is economical to operate and costs little to buy. Of course, a Wells is a handy production saw too, for steady, continuous work—but it is such a capable all-around cut-off tool that most any plant can use one to advantage. Ask your Supply distributor or write us for complete details.

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CAPACITY: Retangular . 8" x 16"	(Special Guides) . 5" x 24"
ROUNDS:	8" diameter
MOTOR:	½ H.P. current optional
SPEEDS:	Selective 60, 90, 130 ft. per min.
WEIGHT:	Approximately 750 lbs.

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Buhr TOOLS A STANDARD DRILL PRESS

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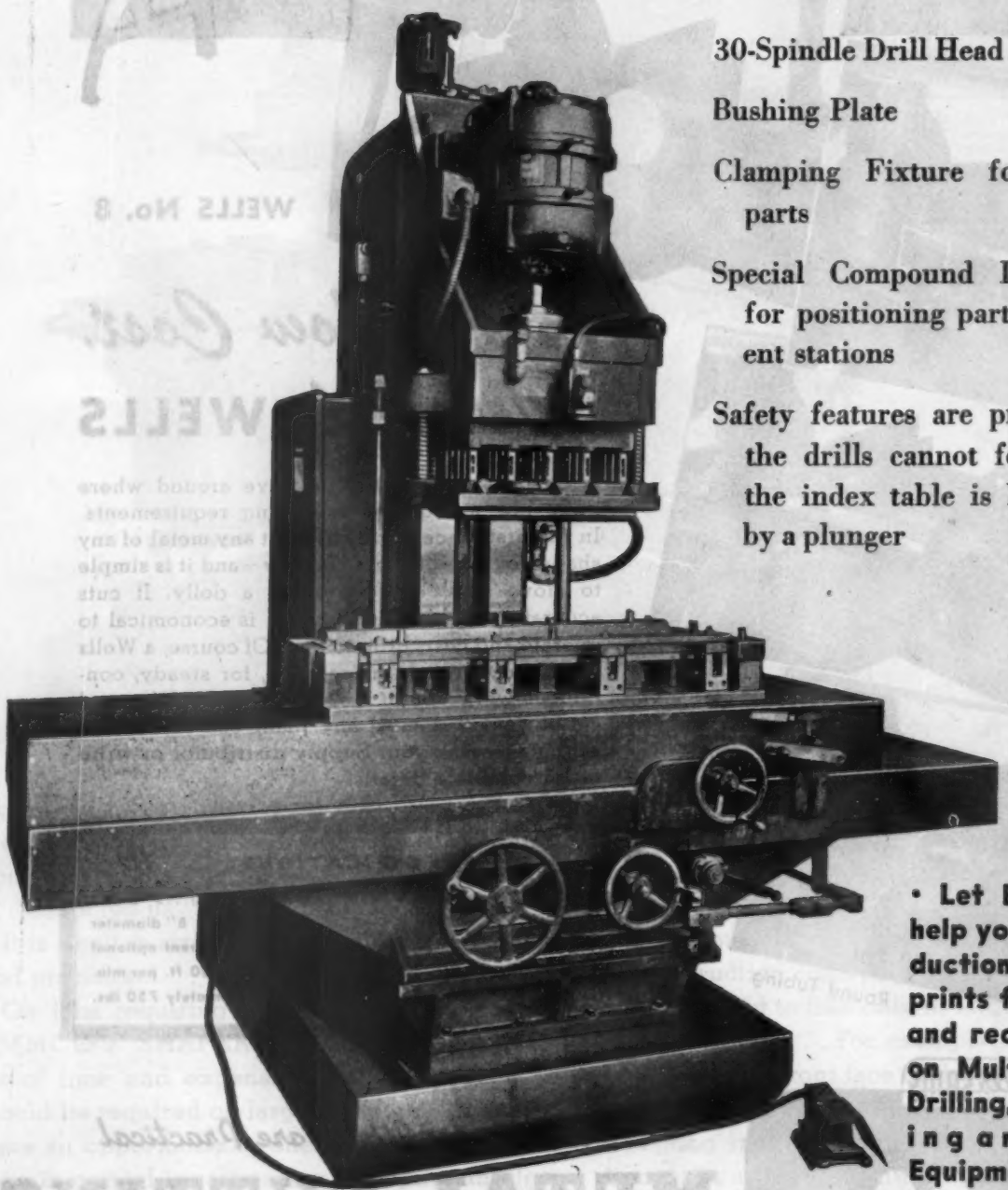

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Bushing Plate

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Safety features are provided so that the drills cannot feed down until the index table is locked in place by a plunger

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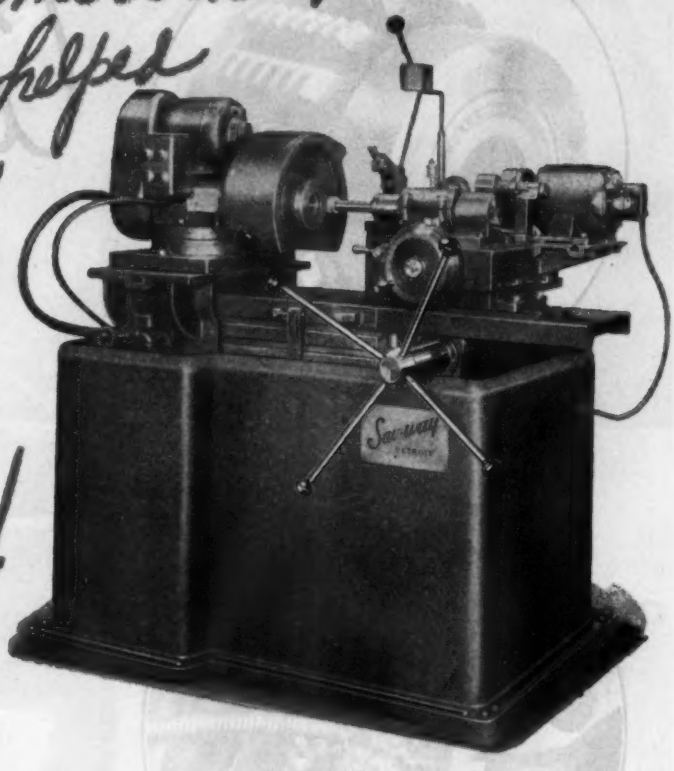
Production America!

The machine you helped design and prove in round-the-clock punishment of war production. Available for Quick Delivery!



This Sav-Way multi-purpose internal grinder has 17 specific features—the features which you production men have asked for. Neoprene insulated against vibration, distortion, mis-alignment. Equipped with the famous Gold Seal Spindle—the spindle that breathes! Combines accuracy and stamina with the speed, flexibility, and wide range adaptability so necessary in the coming period of change-over and new product development. The coupon will bring complete description, specifications and prices.

CLIP THIS COUPON TO YOUR LETTERHEAD

Sav-Way Industries, Box 117, Harper Station, Detroit 13, Michigan

Kindly send me a copy of the illustrated folder describing the Sav-Way M-1-A Internal Grinder.

Mail to the attention of:

Mr. _____

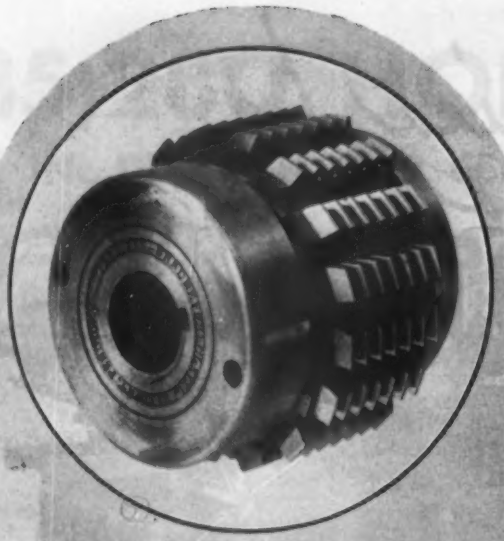
Position _____

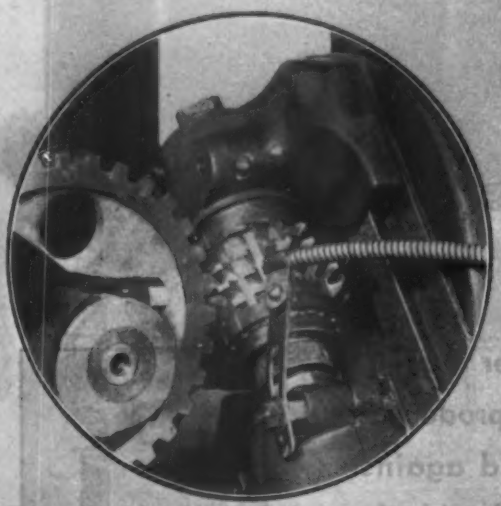
Sav-way INDUSTRIES

Machine Tool Division

BOX 117, HARPER STATION, DETROIT 13, MICH.

BUILDERS OF HAND AND HYDRAULIC INTERNAL GRINDERS · PRODUCERS OF GOLD SEAL SPINDLES
PLUG GAGES · MICROMETER CHECKERS · PRECISION AIRCRAFT, AUTOMOTIVE, AND ORDNANCE PARTS





Coming Events

CAST THEIR SHADOWS AHEAD

The hob shown above is by no means an experiment. In fact, it was the first ground hob ever made.

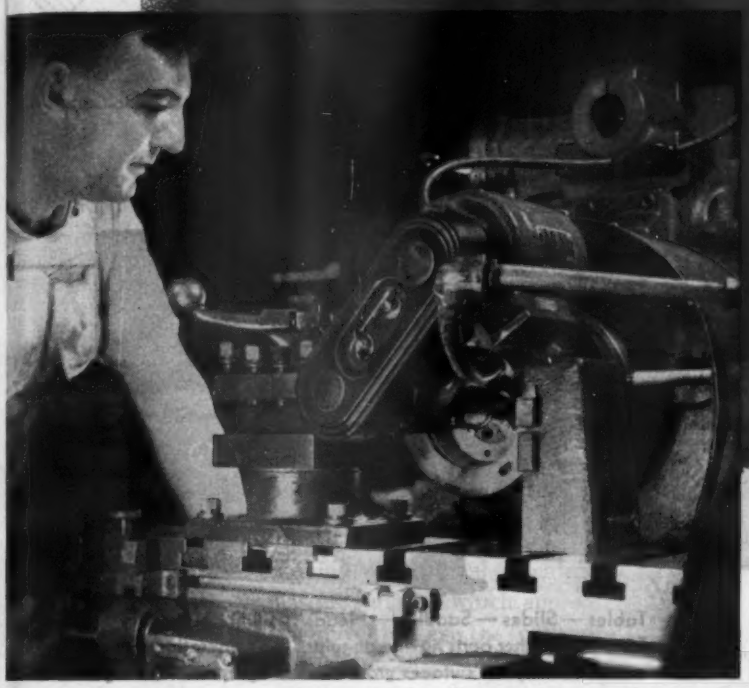
That was over 20 years ago and since then thousands of these hobs have been produced. However, that hob, in its original form, is ideal for carbide application.

It is our intention to bring out postwar an 8-spindle Rotary Hobbing Machine of sufficient stamina and so designed as to take full advantage of this kind of a carbide hob. Watch for it.

The LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.

THREE DIAMETERS *Held True* ON ONE SETUP!



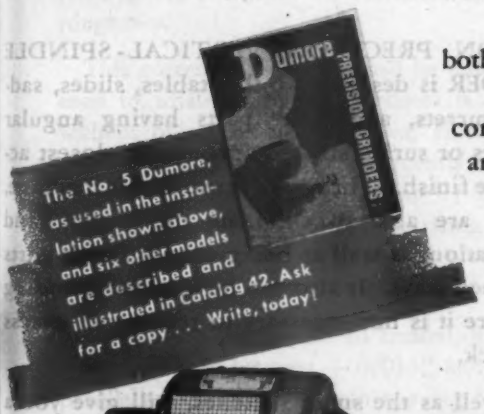
Stainless Steel Bushing, C, diameter ground to a tolerance of .0002" and concentric with diameters B and A, to within .001". Setup comprises Dumore No. 5 Grinder mounted on a Midland Lathe.

INGENIOUS CHUCK AND TOOL ARRANGEMENT CENTERS ON DUMORE GRINDER

Two prime requisites of war production, speed and accuracy, are both exemplified in this piece, part of a highly essential aircraft accessory. The body is aluminum, and diameter A must fit perfectly the corresponding diameter on the mating half. Diameter B is also critical, and both A and B must be concentric with C, which is ground to size in the stainless steel bushing, pressed into the aluminum housing.

By including the Dumore Grinder on the tool setup, a single chucking suffices for the three operations, assures concentricity and reduces machine time to the minimum. Equally important, the unmatched stability and precision of the Dumore Grinder makes it easy to meet the exacting requirements of the Air Corps, in regard to the close dimensional tolerances.

The unusual mounting of the Dumore strikingly illustrates the ready adaptability of this extraordinary tool. Is production grinding to high standards bothering you? Talk to your Industrial Distributor about the versatile Dumore . . . or write direct to The Dumore Company, Tool Division, Dept. TL14, Racine, Wis.



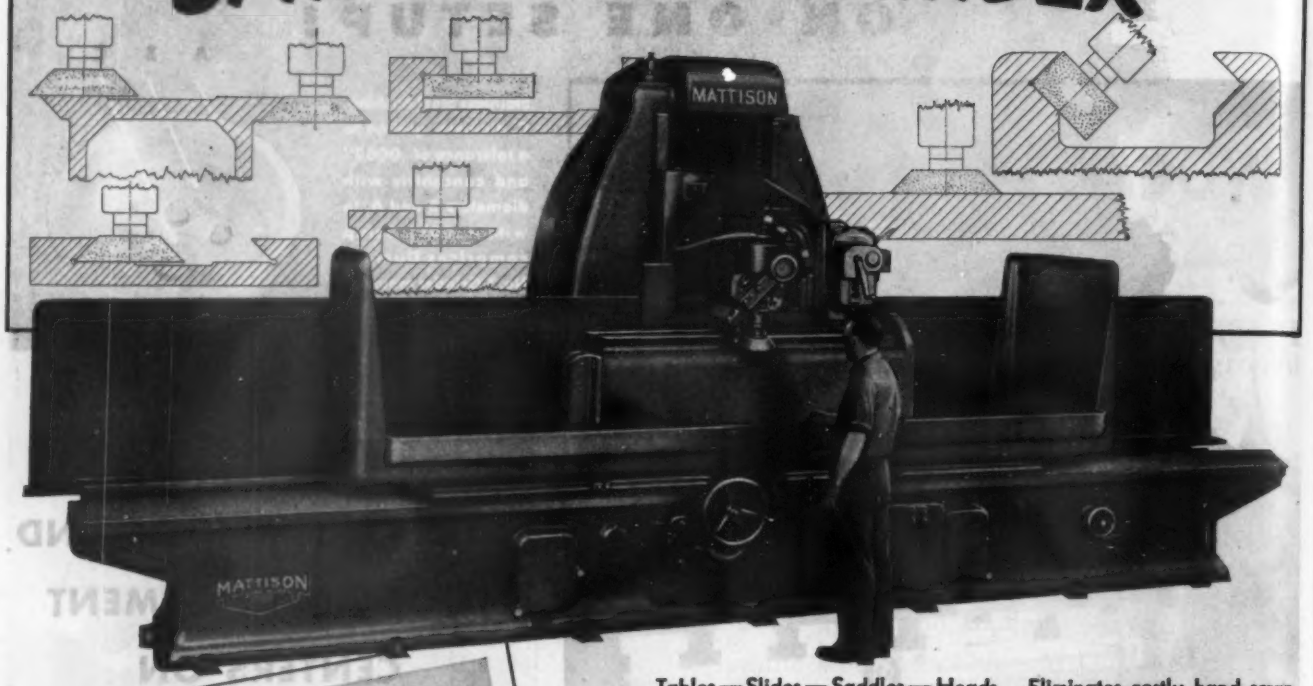
The No. 5 Dumore, as used in the installation shown above, and six other models are described and illustrated in Catalog 42. Ask for a copy . . . Write, today!

SOLD BY AUTHORIZED INDUSTRIAL DISTRIBUTORS IN ALL PRINCIPAL CITIES

DUMORE

PRECISION AND OFF-HAND GRINDERS

MATTISON PRECISION VERTICAL SPINDLE WAY GRINDER



Tables — Slides — Saddles — Heads Turrets and other parts having angular machined ways or surfaces ground to closest accuracy and fine finish.

Eliminates costly hand scraping operation — permits grinding parts having hardened ways.

● MATTISON PRECISION VERTICAL-SPINDLE WAY GRINDER is designed so that tables, slides, saddles, heads, turrets, and other parts having angular machined ways or surfaces can be ground to closest accuracy and fine finish. Through the use of this machine, manufacturers are able to eliminate the costly hand scraping operation, as well as being able to finish parts having hardened ways. It also can be used for grinding flat parts where it is not necessary to remove an excess amount of stock.

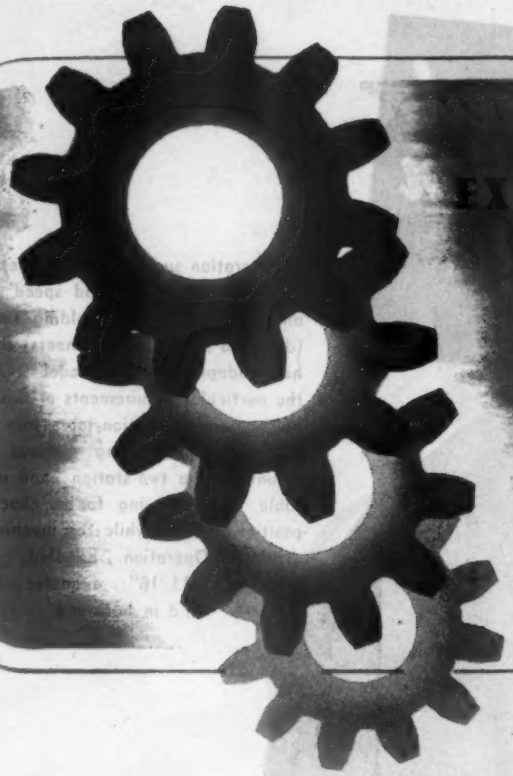
Pictures, as well as the small sketches, will give you a further idea as to the range of work that can be handled on the Mattison Precision Vertical-Spindle Way Grinder.

Here's a newly developed machine that will reduce your finishing costs, increase production and provide precision results on parts having angular machined ways or surfaces.

ADDITIONAL INFORMATION Detailed information and further examples of what this machine can do for you are contained in a new free circular. Send for your copy today.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS



EXCELLENT CHARACTERISTICS OF SHAVED GEARS

Can be Preserved in Hardening

Gear tooth hardness need no longer be a compromise between machinability and wear resistance. Red Ring Rotary Gear Shaving as the final machining operation on the green gear, during which approximately .001″ of stock is removed from the tooth surfaces, corrects cutting errors of index, helical angle, tooth profile, eccentricity and undesirable tooth roughness.

This corrected gear may then be induction hardened to whatever surface hardness is desired and without objectionable distortion. Hardening without detrimental distortion is frequently accomplished on gears carburized after shaving by quenching in dies and sometimes by liquid carburizing and quenching without dies. No grinding of tooth profile is necessary.

On a 5.145″ P.D. gear so treated, final involute error is held to between +.00015″ and —.00015″; parallelism to .0002″; tooth spacing to .0001″ to .0002″; and accumulated error to .0008″.

WRITE FOR DESCRIPTIVE FOLDER ON RED RING GEAR SHAVING

Specialists on SPUR AND HELICAL INVOLUTE GEAR PRACTICE

Originators of ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

NATIONAL BROACH AND MACHINE CO.

RED RING PRODUCTS

3600 ST. JEAN • DETROIT 13, MICH.

This BAKER-designed fixture speeds production of Rocket Shells!

An operation such as this requires the ultimate in accuracy and speed . . . and the special work-holding fixture (designed by BAKER Engineers) shown here adapts BAKER Model 217 to the particular requirements of this important war production job. Note that the two work-holding fixtures are mounted on a two-station hand index table, thus allowing for a chucking position in front while the machine is drilling. Operation handled, drill 1-11/16" diameter from solid in base end.

SPECIAL FEATURES of this machine include a box column type rigid heavy duty drill with a large spindle to permit maximum speeds and feeds . . . quick, convenient change of feeds and speeds by means of pick-off gears . . . multiple splined upper driven spindle for smoother drive to drills . . . multi-vee belt drive from motor to rear of upper column . . . convenient operation via a push button station mounted convenient to operator's position.

An important point to remember is that this is a standard BAKER machine and a standard index table. The only special attachment required to fit this Model 217 to this exacting job was the workholding fixture, designed and furnished by BAKER. Conclusive proof that BAKER machines are flexible and adaptable to your special needs! Write, giving details of your operations and production problems. We are sure we can be of help to you.

BAKER Bros., Inc.

Single and Multiple Spindle Machines for Drilling, Boring and Tapping

TOLEDO 10, OHIO

No. 1-14... 32"x9" table... 14" table travel... hydraulic table feed... full automatic cycle.

● When it comes to change-over for peacetime milling jobs... call on Kent-Owens! In production for war — these machines have performed at a terrific pace with top-dependability. Today — they are ready for important new assignments in production for peace. Rugged...simple... efficient... with practical features that appeal to experienced shop men. Write for latest bulletins. Kent-Owens Machine Company... Toledo, Ohio.

KENT-OWENS

Milling Machines

THERE'S A KENT-OWENS REPRESENTATIVE NEAR YOU

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Don W. Patterson
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Hamilton-Huster Mach'y Co.
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DETROIT
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Eichman Machinery Co.
LOS ANGELES
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F. F. Barber Mach'y Co.
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NEW YORK
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Calco Machinery Company
PITTSBURGH
Barney Machinery Company
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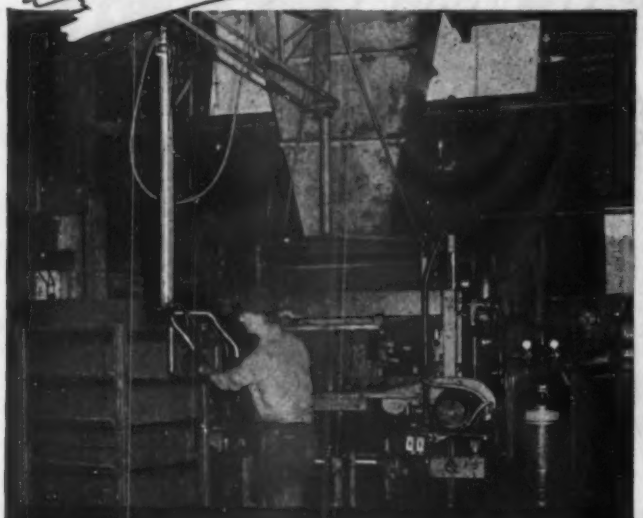
Reduce Handling Costs —Speed Production



with **CURTIS AIR HOISTS**

Illustrated above is an application of a Curtis Air Hoist used to off-bear concrete blocks. In hundreds of other uses, for any lifting operation, Curtis "One-Man"—or "One-Woman"—Air Powered Hoists provide faster, more accurate lifting; they release men for other jobs, reduce worker fatigue, and save time and money.

Having less dead weight than other types of power hoists, Curtis Air Hoists permit light supports and easier moving of trolley mounted models. They are immune to overloads and can be operated by any man or woman in your plant. Faster, yet little more expensive than a chain block.

Curtis Air Hoists are available in capacities up to 10 tons—pendant or bracketed types. For suggestions as to how Curtis Air Hoists can speed up your production and lower your handling costs, write for full information and for free, handy booklet, "How Air Is Being Used in Your Industry."

CURTIS

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CURTIS PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1924 Kienlen Avenue, St. Louis 20, Missouri

Please send me booklet, "How Air Is Being Used in Your Industry."

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PORTAGE

HORIZONTAL BORING, DRILLING AND MILLING MACHINE NO. 4

• Featuring an extended saddle and table with outer rail support for maintaining exceptional accuracy on long work. Get fully acquainted with the many features of this modern Boring Mill. *Ask for a copy of our new instructive bulletin which points out the numerous advantages of this new Horizontal Boring, Drilling & Milling Machine.*

THE PORTAGE MACHINE CO.
AKRON 11, OHIO

TOOLMAKERS . . . *meet the* "LINLEY"

If you are not now acquainted, this may be the beginning of a long friendship. For here is a little toolmaker's pal that won't let you down.

For the innumerable small jobs . . . die and jig making, models, metal patterns, drilling, reaming, etc., the LINLEY is fast, accurate, dependable, and always ready to "take over" for expensive higher rated machines that should stay in their own capacities.

There are 8 speeds to 4250 r.p.m., feed is smooth without quill backlash, bearings grease-sealed, micrometer screw feed head, ample table size (7"x17½") and small floor area (18½"x20").

An introduction to the LINLEY is yours for the asking.

BULLETIN SENT ON REQUEST

LINLEY BROTHERS COMPANY
864 STATE ST. EXTENSION
BRIDGEPORT 1, CONN.

"It Looks Like We'd Do It Better on a Hydratrol Lathe!"

30" Heavy Duty Lathe with 13" Hole in Spindle

Do It Better!...on a HYDRATROL LATHE

Large Hollow Spindle Type

Look around your own shop—you may find a number of machining jobs which possibly could be done better on Large Hollow Spindle Type of HYDRATROL LATHE. Send us prints of these difficult or too-costly jobs, for a specific, time-and-money-saving recommendation.

FOR FASTER PRODUCTION • BETTER WORK • LOWER COSTS!

5 SIZES—18" to 36"

Small	18" up to	7¼" Hole
Medium	24" up to	12" Hole
Large	27" up to	13" Hole
Large	30" up to	14" Hole
Large	36" up to	16½" Hole

(Standard type lathes, 16" to 36")

Lehmann MACHINE COMPANY

CHOUTEAU AT GRAND • ST. LOUIS 3, MO.

FOR PRODUCING SMALL PRECISION PARTS FROM BAR STOCK ON A HIGH PRODUCTION BASIS

Wickman MEETS Every NEED

TWO SWISS TYPE HIGH PRECISION AUTOMATICS

Wickman Swiss Type High Precision Automatics are unequalled in the rapid, accurate production of small slender parts such as those for instruments, watches, and other precision mechanisms. They employ the Swiss principle of cam controlled coordinated tool and headstock movements to generate even the most intricate forms with single point tools. The No. 1 machine, accurate to ± .0002", will handle 5/32" and smaller bar stock for parts up to 1 9/16" long. The capacity of the No. 2 machine, accurate to ± .0005", is 1/2" diameter by 4" long.

A FULL COMPLEMENT OF ATTACHMENTS

The complete set of attachments for performing secondary operations on both Wickman Automatics includes a three spindle attachment for drilling, reaming, threading, tapping and similar operations; a high speed drilling attachment; a threading and tapping attachment; a screw slotting attachment; a side milling attachment; and a taper turning attachment for extreme accuracy in long taper turning.

COMPLETE TOOLING SERVICE

We can promptly furnish you with complete tooling including tools, cams, collets and tungsten carbide guide bushings made and tried out under production conditions in our Detroit plant. Thus perfect performance on the job is assured. If you prefer to finish your own tooling, complete stocks of blanks are maintained ready for immediate shipment.

A COMPETENT ENGINEERING STAFF

A capable staff of engineers with wide experience in Swiss Type Automatic work is always at your service. They will process the part, as well as design and make the tools.

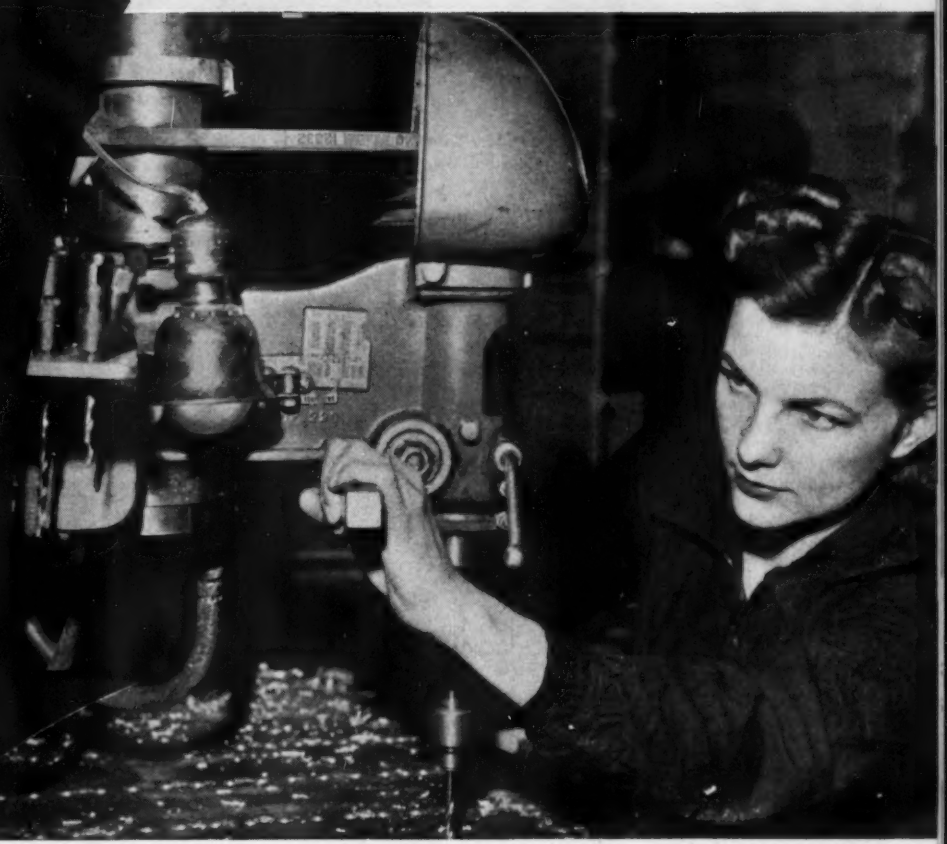
If you are producing small precision turned parts, call in a Wickman engineer. Without obligation he will gladly show you where Wickman Swiss Type High Precision Automatics can help in your production.

THE Wickman CORPORATION

15539 WOODROW WILSON AVE.
DETROIT 3, MICHIGAN

Delta Machine Tools

serve you far beyond normal expectancy



because of these *Quality* features

1 **Double-sealed New Departure ball bearings**

Keep out abrasive shop dust. The proper type and amount of lubricant is "sealed-in" at the factory for the life of the bearing.

2 **Pre-loaded bearings**

Eliminate unnecessary play — provide extra rigidity—reduce vibration—and prolong life.

3 **"Diamond-bored" seats** *(precision-bored)*

Attained by a rigid boring bar that does not deflect under pressure, and by precision mounting of the bar in the boring head.

4 **Balanced pulleys**

Highly accurate balancing prevents the transmission of belt-pull to spindle — reduces spindle wear and vibration.

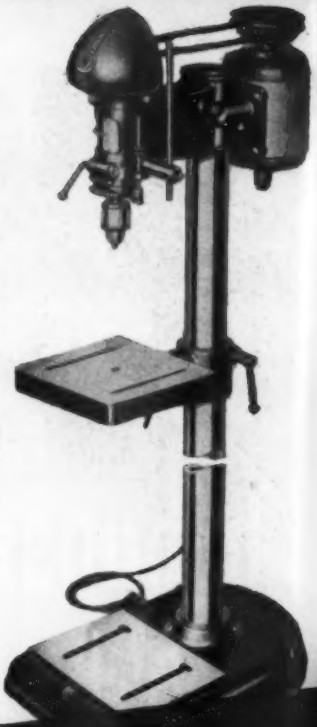
5 **Precision-ground shafts**

Through expert grinding to close tolerances, shafts run true, smoothly and without vibration.

..and here are the machines themselves, **TURN THE PAGE**

Delta Floor-Type Multiple-Spindle Drill Presses

4-spindle model illustrated. 2 spindle model also available with one-piece table. Floor types with sectional tables: 3-, 4-, 5-, 6-, and 8-spindle.



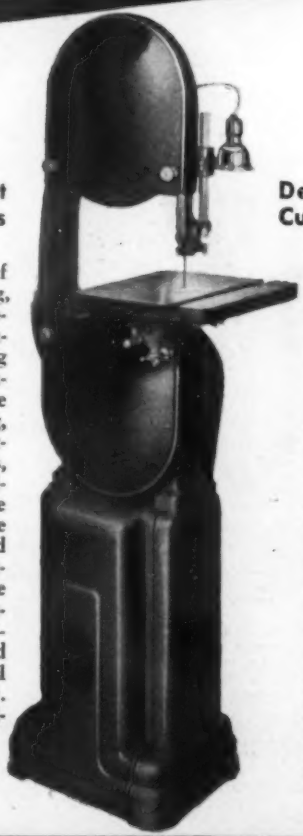
Delta 14" Floor-Type Drill Press

Delta's patented construction provides *both* a self-aligning drive and a free-floating spindle. Many outstanding features, including smooth-working table-raising mechanism, built-in depth gauge, streamlined safety belt guard, quill with 5" stroke or travel, etc.

Save *Time* and *Money* on with low-cost, dependable

Delta 6" Abrasive Belt Finishing Machine gives you top efficiency

Handles dozens of sanding, polishing, and finishing operations — polishing and sizing metal parts, finish- and polishing die castings, finishing, finning and surfacing plastic parts, etc. Set horizontally with wood fence for edge or face sanding, or used vertically in connection with the 7½ x 14¾" tilting table. Completely equipped with double-seal ball bearings. Many other quality features.



Delta 14" Metal-Cutting Band Saw

This low-cost, high-quality machine cuts anything from carbon steel to asbestos —has dozens of uses in the general tool and machine shop, also the pattern shop (4 metal-cutting speeds, 1 wood-cutting speed). Delta features: 10 *New Departure Self-sealed ball bearings* carry all wheels and shafts. *Heavy table,* 14" x 14", swings smoothly. *Simple, foolproof gear drive.* Guides give micrometer accuracy with independent adjustments. *Safety features* complete, meet all requirements.

Worm-driven power feed operates directly off motor — giving 8 *rates of feed for each spindle speed.*

Delta Power-Feed Drill Presses

One swift hand motion brings drill down to work. Automatic stop and spindle return. *Instant* switching from heavy power-feed operations to sensitive hand drilling. 17-inch single spindle drill presses available in 24 different models.

DELTA-MILWAUKEE . . . *pioneers of small, compact, du*

Delta Cut-Off Machine eliminates expensive finishing

Cuts plastics, non-ferrous metals, etc. to exact length with polished smoothness; polishing and burring usually unnecessary. (Also convertible to abrasive cutting of steel.)

Delta Carbide Tool Grinder Runs True

Free from vibration, for delicate grinding of carbide-tipped tools. Combined with Delta standard tool grinder for hogging down the shank steel, it gives you a perfect working combination for sharpening tungsten carbide tools.

Delta Grinder with Twin-Lite Shields

gives you extra convenience, efficiency, safety.

Twin-Lite Safety Shields act as "built-in goggles," flooding the work with light. Tool rests fully machined. Wheels balanced to 1/10 inch ounce. Precision double-sealed New Departure ball bearings, lubricated for life. Heavy, rigid base.

post-war retooling DELTA Machine Tools

DELTA MILWAUKEE Machine Tools

Delta Toolmaker Surface Grinder

gives dependable, trouble-free results. This husky, big-capacity grinder is a "heck of a lot of machine for the money," say delighted users. Ideal for surface grinding, tool sharpening, etc.

Designed for ease and speed of operation. Convenient controls . . . wide graduations on micrometer for close settings . . . unique wheel-adapter that saves time on truing-up operations . . . many other features that assure you creditable performance. 7 x ½" wheel, 1¼" bore.

With the Univise, the first truly universal vise for grinding, drilling, and milling and the coolant attachment, this machine serves as a dependable, accurate Chip-Breaker Grinder for grinding the chip-breaker groove on carbide-tipped tools. Holds the tool at any conceivable angle — accurately reset at a moment's notice.

With the Unihead, and the tool and cutter grinder attachment, it becomes the latest development in Tool and Cutter grinding. Simple, accurate, and very low in cost. Delta construction features assure perfect alignment and freedom from play. Substantially built and machined to very close tolerances. Table surface 5¾ x 13".

SEND FOR CATALOG

Coupon on next page

Mail the coupon! These valuable books contain information that will help you cut costs, and increase production now, and in reconverting for peace.

ct. durable, low-cost machines for heavy-duty production work

Delta's 76-Page Blue Book gives you 140 case histories

of special machines with Delta components

...demonstrating how you can break Reconversion bottlenecks!

You save time and money with low-cost special purpose machines built from standard Delta units

Illustrated and fully explained are many ingenious combinations built with Delta components that give your production staff a running start in post-war re-tooling and change-overs. You save time by avoiding long shut-downs during re-tooling — you save money by eliminating the cost of purchasing bulky, space-consuming machines that may take months before delivery is made.

Send for your free copy today and see how you adopt these modern methods to your own particular problems.

THE DELTA MANUFACTURING CO.
609M E. Vienna Ave., Milwaukee 1, Wis.

Please send me my free copy of your new 76-page Blue Book, and Catalog of low-cost Delta Tools.

Name..... Position.....

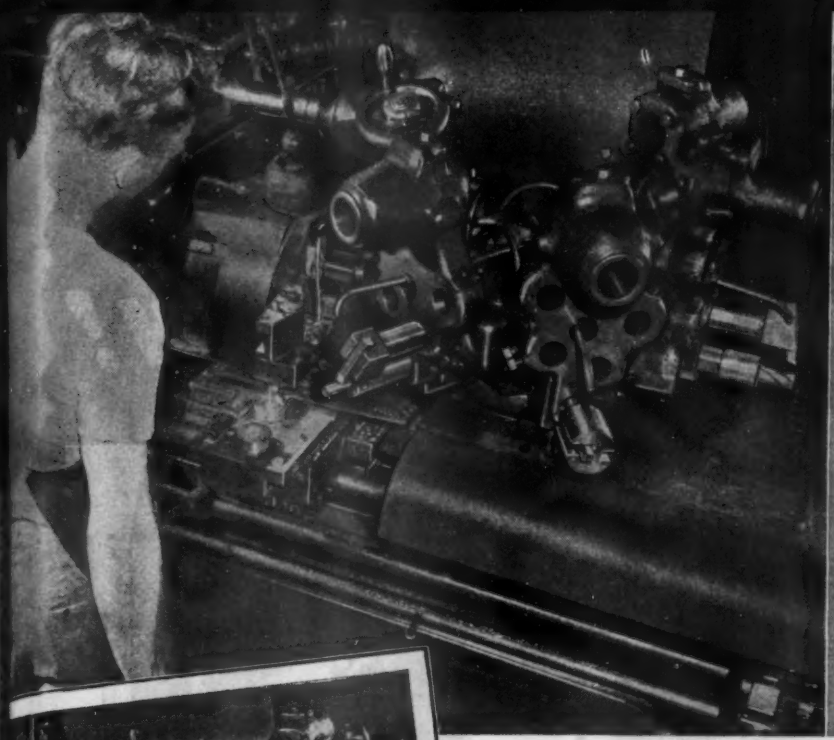
Company.....

Address.....

City..... (.....) State.....

Tear Out and Mail Coupon

Send today for your free copies of these valuable books. Consult your Delta-Milwaukee distributor regarding deliveries.



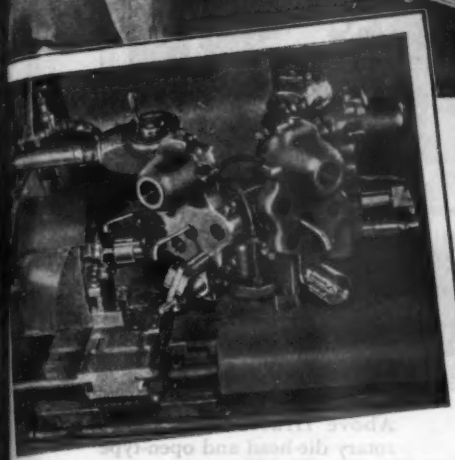
Fastermatic SAVES 4 HOURS PER 100 PIECES ON GEAR BLANK JOB

and Improves Accuracy of Product

Performing 9 operations in one chucking on cast bronze resilient gear blanks, a Foster Fastermatic Model 1FUT Automatic Turret Lathe in a large Eastern war plant cut the best previous machining time by an average of 45% and provided marked improvements in finish and accuracy of the piece. Operations include rough and finish turning, facing, chamfering and counterboring. Loading and unloading require but 15 seconds—floor-to-floor time is down to 2½ minutes—total savings in machining time average 4 hours per 100 pieces handled.

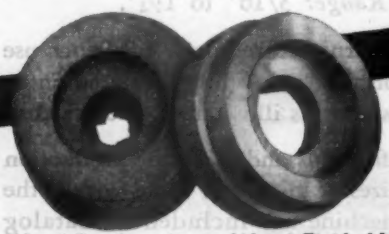
These savings are typical of Fastermatic installation and result from such Foster high-production features as the automatic cycling of the machine, the hydraulic feed system and automatic speed control. Capable of maintaining tolerances of plus or minus .0005", even in high-speed operation, Fastermatic's tool-room precision on production work is inherent in the machine's design. Accuracy never depends on the skill or training of the operator. Fastermatics use standard tools which can be switched quickly with but minor adjustments to other jobs, an important additional saving of time and money in the shop. These machines have proved production pace setters in most of the country's busiest war plants. Because they are completely automatic, the operator's time is devoted solely to loading and unloading—one operator frequently handles several Fastermatics with resulting savings in labor expense.

Foster Fastermatics are available in four models to fit the requirements of practically any job. Model 1FUT has a swing-over bed of 21 inches; Models 2FUT, 3FUT and 4FUT measure 25¼, 28½ and 35½ inches respectively.



Fastermatic PRODUCTION DATA

Part—Blanks for resilient gears.
Material—Cast bronze.
Holding Method—Pneumatic 3-jaw chuck.
Speeds—All 9 operations—332 r.p.m.
Feeds—1st Position—.0053"
2nd Position—.0071"
3rd Position—.006"
4th Position—.0045"
Attachments—One adjustable boring head.
Production—2½ minutes floor-to-floor.
Saving—4 hours per 100 pieces.



(Above) *Rough casting* (Above) *Finished blank*

GET THE FACTS *Free!*

Learn how Fastermatics can help you solve knotty production problems. Write for your free copy of this new Fastermatic catalog complete with facts and data that every production man needs to know about these high-production machines. Address Foster Division, 1110 Beardsley Ave., Elkhart, Indiana.

INTERNATIONAL MACHINE TOOLS

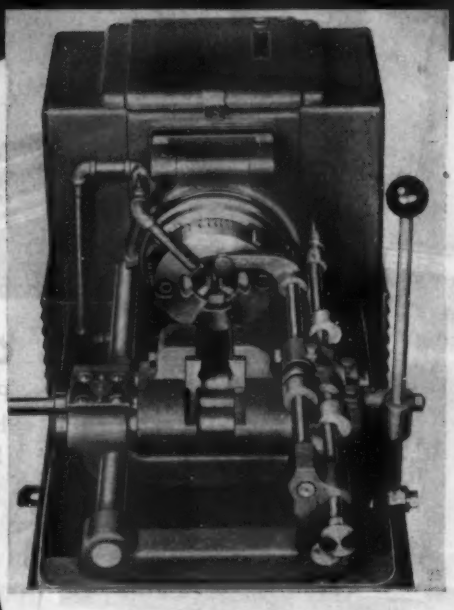
Foster Division - Elkhart, Indiana

INTERNATIONAL DETROLA CORPORATION

DETROIT, MICHIGAN • ELKHART, INDIANA • INDIANAPOLIS, INDIANA

OSTER FASTERMATICS • LIBBY HEAVY DUTY TURRET LATHES • STANDARD TOOLS • SUPERFINISHING MACHINES • SPECIAL MACHINE TOOLS

IT'S A HONEY TO THREAD WITH!



Above illustration shows rotary die-head and open-type vise which permits fast, easy handling of stock in and out of machine.

Die-Head is fully adjustable with replaceable die-holder. Dies are *high speed steel* . . . segmental type . . . one or more can be replaced without renewing entire set.

OSTER

No. 531 "TOM THUMB" THREADING MACHINE

As the ONE machine for ALL the work or as an AUXILIARY to the big threading machines, No. 531 "TOM THUMB" is used widely in large or small shops.

Production speeds on pipe run from 13 seconds for ⅛" to 23 seconds for 1¼". Bolt and rod threading speeds range from 25 to 33 seconds depending on size of stock. (Above speeds include gripping in vise, threading, and removing from vise . . . complete floor to floor time.)

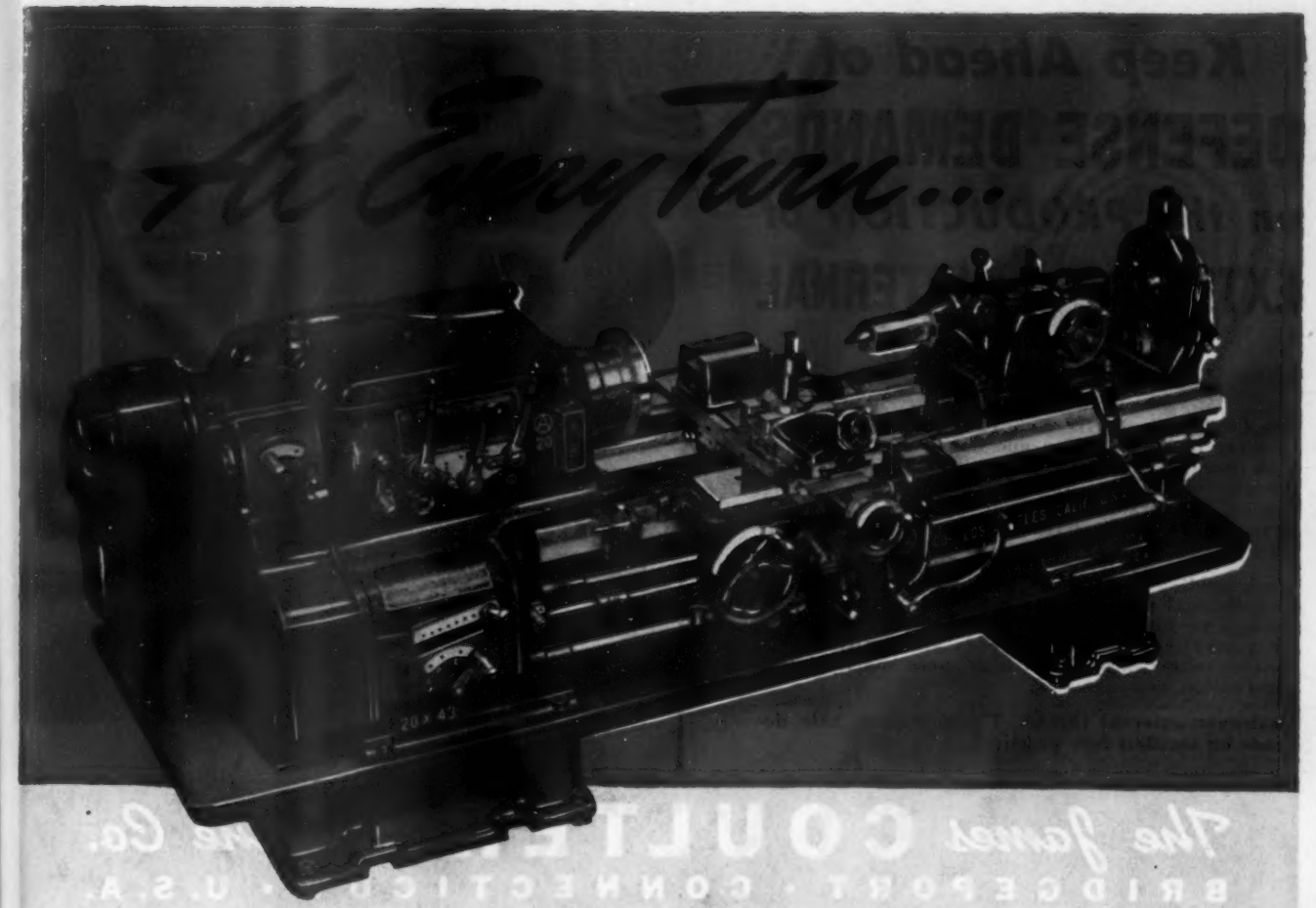
Range of the No. 531 "TOM THUMB"

Standard Pipe Range: ⅛" to 1¼".
Standard Bolt Range: 3/16" to 1½".

The machine is furnished regularly for bench use but, for easy portability, it can be mounted on an all-steel wheel stand (as illustrated) at extra cost.

Complete specifications and tables of production speeds on all sizes of pipe and bolts within the range of the machine are included in Catalog "LIST NO. 7-B". Write for a copy.

THE OSTER MANUFACTURING COMPANY • 2049 EAST 61ST STREET, CLEVELAND 3, OHIO, U. S. A.



TODAY AND *Tomorrow!*

American ingenuity, meeting the challenge of wartime supply and demand, has produced many substitutions for hard-to-get materials . . . *But*—there can be no substitution for the work of heavy duty lathes. Throughout the metal working world the lathe has been supreme—and always will be.

Exact tolerances and fast reliable turning demanded by precision production, place this one machine in a class by itself. Everywhere you go lathe work keeps step . . . an integral part of every modern mechanism.

Thirty years of painstaking development by Axelson engineers, using complete facilities housed in one plant, have built up the ever increasing popularity of AXELSON LATHES!

Axelson Lathes, of various lengths, are manufactured in 14, 16, 18, 20, 25 and 32- inch sizes.

AXELSON MANUFACTURING CO.

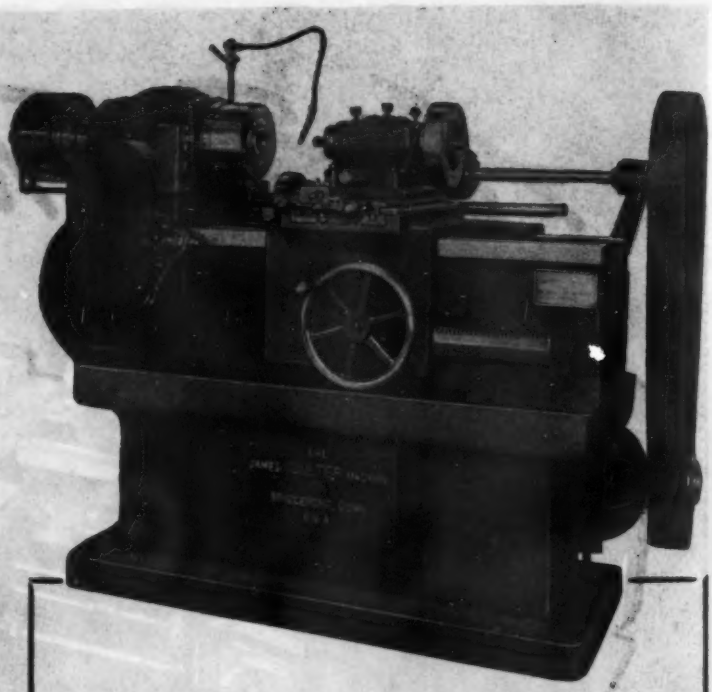
6160 S. Boyle Ave. (P. O. Box 98, Vernon Station), Los Angeles 11, Calif. • 50 Church St., New York City 7 • 3844 Welsh St., St. Louis 16, Missouri

BUY WAR BONDS

AXELSON LATHES

Dependable for over a Quarter Century

Keep Ahead of DEFENSE DEMANDS on the PRODUCTION of EXTERNAL and INTERNAL THREADS



The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

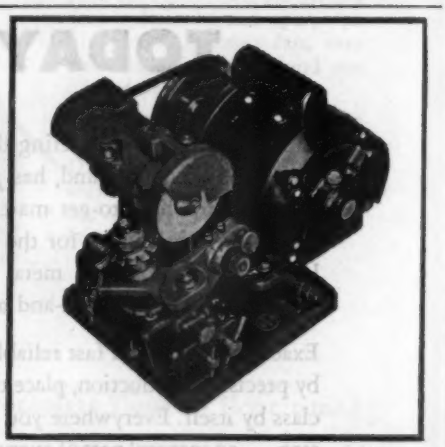
Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

The James COULTER Machine Co.
BRIDGEPORT • CONNECTICUT • U.S.A.

MAINTAIN "ORIGINAL - CUTTER" SHARPNESS ON THE Waltham CUTTER SHARPENER



No machine is better than the cutting edge of the tool it uses. Tools that are sharp are economical —they require less power—produce more work—maintain required tolerances—produce a better finish.

The Waltham Cutter Sharpener is designed to *keep* cutters sharp, and to do it economically and accurately. This machine will sharpen such tools as those used for gear cutting and thread milling, circular form tools, straight fluted hobs and multiple cutters, etc. It can be run at peak efficiency by semi-skilled operators after a minimum of instruction.

If you have tools 2" in diameter, or less, which must be ground radially or with rake angle, it will pay to get further information on the Waltham today.

EDWARD BLAKE COMPANY

634 COMMONWEALTH AVE.
NEWTON CENTRE 59, MASS.

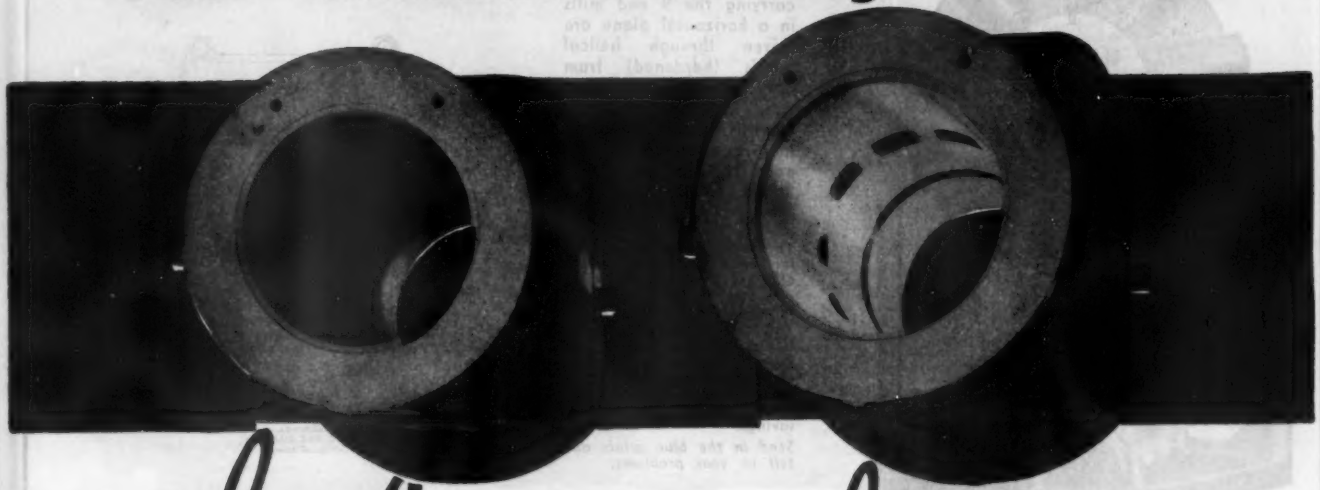
BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—WALTHAM CUTTER SHARPENERS

Please send me Bulletin No. 344 which describes the Waltham in detail.

A.M.

Name..... Title.....
Company.....
Street.....
City..... State.....

Here's Proof That Honing is a Better Solution to Your Internal Finishing Problems



COMPARE THESE UNRETOUCHED PHOTOGRAPHS MADE before AND after HONING

• A BARNESDRIL Honer produced the finish shown here, accurate to within required tolerance of .001", successfully eliminating all surface irregularities, tool marks, chatter, hills and valleys, etc. The photographs, shown above, are unretouched in any manner and were made of this Diesel engine cylinder before and after honing.

In countless applications like those shown on this page, BARNESDRIL Honers are producing finish on internal surfaces of bores, short or long, within a range up to 42" diameter with outstanding savings in time and manpower. Finish accuracy of .0005" or less on small work, where required, may be obtained with BARNESDRIL Honing Machines.

BARNESDRIL Honers are available in vertical, horizontal or angular types with one or more spindles. Single spindle honers are recommended for honing of individual parts where high production is not required. Multiple spindle machines are being used successfully and extensively for the honing of work such as cylinder blocks, and for the mass production honing of individual pieces chucked on a special multiple holding fixture.

(Above)—Honing bore of airplane landing gear strut to insure oil-tight fit of hydraulic plunger. (Left)—Parts like these are just a few of the many applications of BARNESDRIL *Honers.*

Consult BARNESDRIL Engineers ...See How Honing Can Help You

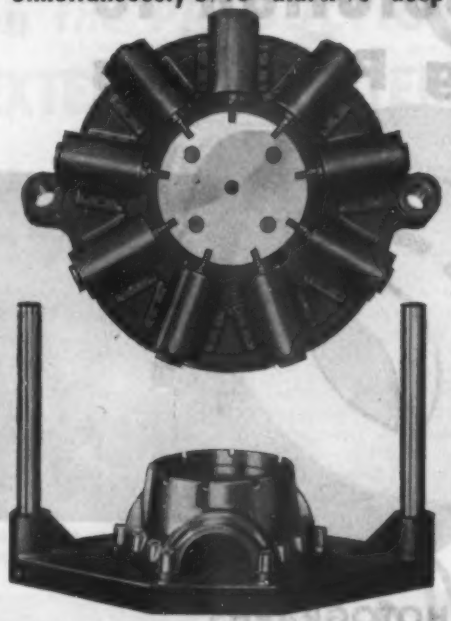
When planning the production of your new product, or when you retool to again begin production of your pre-war and post-war products, take advantage of the rapid strides made in the refinement of the honing process during these war years. Submit part, print or specifications to BARNESDRIL engineers. You'll receive their recommendations on the right Honer for your work without obligating yourself in any manner. Meanwhile, write for the FREE book, A-121, on the BARNESDRIL Honing Process.

Barnes Drill Co.

830 CHESTNUT STREET
ROCKFORD
ILLINOIS, U. S. A.

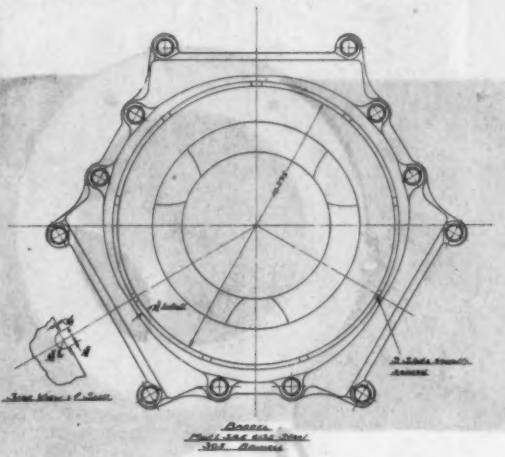
End Milling 9 Adjusting Nut Locking Slots on a Propeller Hub...

Simultaneously 5/16" dia. x 3/8" deep



The 9 Spindle Head (looking up at the bottom) mounts on a standard Heavy Duty Driller and travels upon the guide bars shown as a part of the fixture. The work—a propeller hub—is mounted on this fixture and located by two dowel holes. Due to the method of operation of the plate in the center of the head (sliding on four short guide posts and backed up by four springs) there is no necessity of clamping the hub since this hold-down plate clamps the work until after the operation on the hub has been completed and the head returned to its original position.

The 9 horizontal spindles carrying the 9 end mills in a horizontal plane are driven through helical bevels (hardened) from a 9 Spindle Regular Multiple Head — the horizontal spindle housings however being an integral part of the regular 9 Spindle Head.



The old method for making locking slots was by means of a hand miller end milling one slot a time and then indexing the hub nine times. The tremendous saving, using Hoefer Heads, is very apparent. Maybe you have an unusual job to which our engineers can apply a Multiple Head, bringing about large savings.

Send in the blue prints and tell us your problems.

Hoefer's Whole Business is Holes . . . . **HOEFER MFG. CO.** *Freeport, Ill.*

Double your output with new, carbide tipped Cal-Cutters

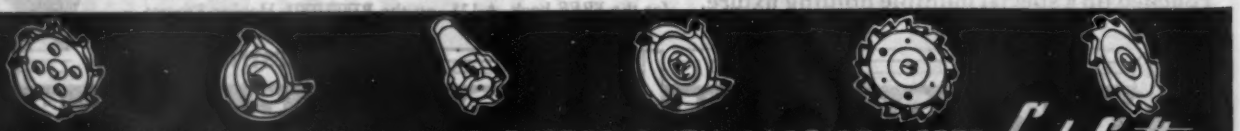
CARBIDE TIPPED Cal-Cutters give big increases in production on standard milling machines. That's why it's so important to consider Cal-Cutters now when production is urgent! *Cal-Cutters are designed to operate at the feeds and speeds available on your present machines.* Any mill up to 10 years old in average good condition can conservatively double its present output —and often produce many times more—when Cal-Cutters are mounted on the spindle. This is true on almost every metal where high speed steel tools have been used in the past, whether it's cast iron, tough alloy steels, dural, brass, etc.

Hundreds of records show even more phenomenal increases in output—as much as 5 to 15 times greater with Cal-Cutters. *So we urge you—take advantage of Cal-Cutters' possibilities.* Lower your production costs, multiply your output and get a new kind of satisfaction in watching your present machines pile up production!

Cal-Cutters are made in types and sizes for all operations in all metals.

Write for catalog and ask for demonstration.

MACHINERY MANUFACTURING CO.
1911 E. 51st STREET, LOS ANGELES 11, CALIFORNIA



YOU CAN MILL IT FASTER—MILL IT BETTER—WITH CARBIDE-TIPPED Cal-Cutters

HIGH SPEED PLANING

and superior finishes
ACHIEVED BY ALL-INCLUSIVE RIGIDITY

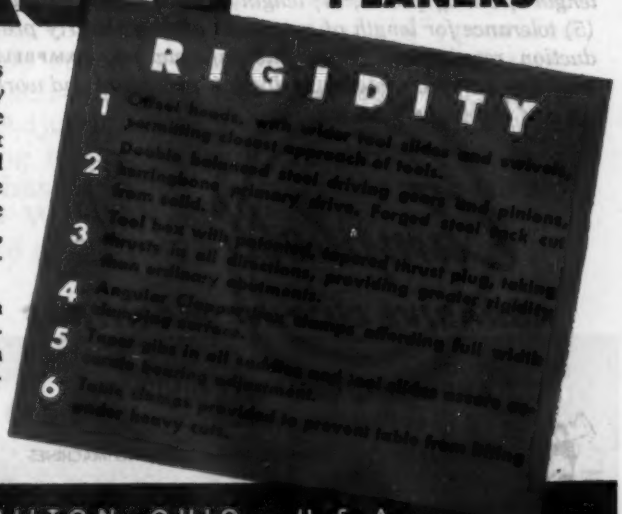
LIBERTY

CONVERTIBLE PLANERS

Increased output per planer-hour, to meet tomorrow's price structure, is amply provided for by the *staunch rigidity* of Liberty construction. For this Liberty combines a table speed range of from 8 FPM to 240 FPM, with the greatest possible all-inclusive rigidity of housings, cross rails, tool boxes, racks and driving mechanism. It also affords the versatility of the Open Side and the rigidity of the Double Housing Planer. Man-hours, too, are saved with simpler, easily sharpened tools, quicker work set-ups, fully automatic control.

Now is the time **to plan postwar *low cost production* with ultra-modern Liberty—available today. There's no obligation in asking Liberty Engineers to explain how you can get greater production faster, more accurately, automatically—at lower cost.**

Ask today for Bulletin 152, no obligation.



LIBERTY PLANERS HAMILTON, OHIO • U.S.A.

Over a Quarter Century of Specialized Experience with Time Tested Principles of Design

POSTWAR

an announcement and a suggestion:

ANDREW C. CAMPBELL DIVISION developments for postwar are well past the "imagineering" stage. The complete line of **CAMPBELL ABRASIVE CUTTING MACHINES** is being redesigned for higher efficiency —longer wheel life—greater adaptability—more automatic features. In short, **CAMPBELL** machines are being prepared for the more highly competitive production demands that lie ahead.

To illustrate: A new, completely automatic abrasive cutting machine is now a reality. The first model has already been produced—the second and third are "on the boards." By making possible the running of several machines by one operator, this machine will find many applications where it will speed production and cut costs.

We suggest this: Consider any cutting operation you may have in the light of new, improved methods of abrasive cutting. Write us about it. We may be able to show you a way to get into postwar competitive production—*faster*.

• • •

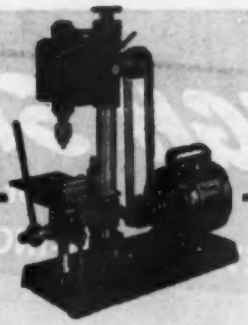
Tell us (1) the range of sizes, (2) kind of material, (3) length of cut-off pieces, (4) length of stock before cutting, (5) tolerance for length of cut pieces and (6) hourly production requirement. With this information, **CAMPBELL** *engineers can recommend production procedure and work up cost sheets for you.*

Campbell

ABRASIVE CUTTING MACHINES

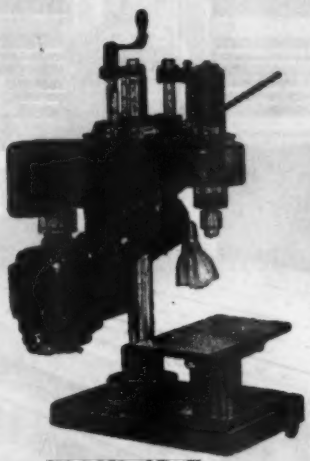
ANDREW C. CAMPBELL DIVISION
BRIDGEPORT · CONNECTICUT
ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ACCO AMERICAN CHAIN & CABLE COMPANY, Inc.



HAMILTON MUEHLMATT SENSITIVE TAPPER

A high production sturdy little machine particularly suited to precision tapping of light work—instruments, cameras, watches, clocks and the like. Easy to operate—can be attached to any light socket.

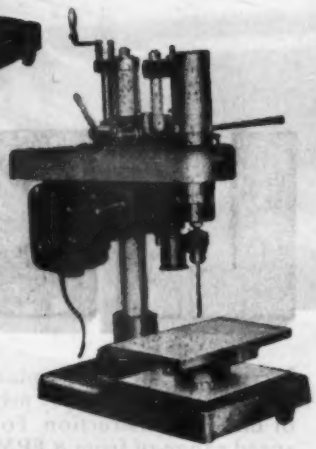


"VARIMATIC"

Built with instrument precision allows instantaneous variable speed adjustment in two ranges. Low range 840 — 270 R.P.M. High range 2900—9300 R.P.M. Drill capacity .004" to 5/16".

MAXI-JR-E

Designed and built for accurately drilling small holes .004" to .250" diameter. It consists of a self contained drilling unit which swings radially on the column and may be locked in any desired position. This extremely flexible small drilling machine may be ganged for sequence operations or to increase production. Spindle speeds from 750 to 8,750 R.P.M.



The "Varimatic" and the Maxi-Jr.-E each feature a full floating spindle of special design which eliminates radial belt pull on the spindle.

•

Write for full particulars on any or all of the machines shown.

The Hamilton Tool Co.
830 NINTH ST. HAMILTON, OHIO

You Can Get The Work Out With These Versatile, Wade Standard

PRECISION HAND SCREW MACHINE UNITS

Wade

Bench Lathes and Profilers For Precision, Versatility And Stamina

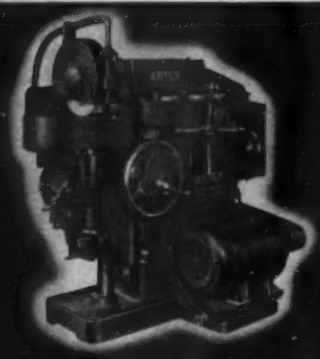
Wade Standard Precision Hand Screw Machine Units get the work out . . . they're built for precision production operations. • Headstock has double row roller bearing. • Lever Closer runs on ball bearing; operates positively to open or close collet with instant movement. • Double Cross Slide movement 2¾"; provided with adjustable stops. • Automatic Turret Attachment; Tilted self-clamping 6-station head; takes ¾" shank tools; Adjustable stops index automatically. • Turret working travel 3¼"; indexing travel 1"; total 4¼". • Unit has 32" bed. • Collet cap: Model #5, ¾"; #7, 1". • Weight, net: #5, 172 lbs., #7, 184 lbs., with laminated maple top steel bench, approx. 660 lbs.

Write today for catalog

THE WADE TOOL COMPANY

WALTHAM 54, MASSACHUSETTS

Versatility of Arter Rotary Surface Grinders is again demonstrated—this time in very small parts of Hamilton Navigation Master Watch and Hamilton Marine Chronometer, ground by ARTERS . . . used in tanks, planes and anti-aircraft batteries . . . and the master time source for Marine navigation . . . marvels of precision . . . and Arter is proud to play a part in their production.



ARTER

ARTER GRINDING MACHINE COMPANY

WORCESTER, MASSACHUSETTS • U. S. A.

LEACH External Grinder

PRICE

$875.00

Fully Equipped

Our dealers will help you fill out necessity priority forms.

Write us today for your nearest dealer's name and address.

Grinds Work from ¾" to 11" in length and from ⅛" to 7" in diameter.

Send for Descriptive Literature

EXCELLENT DELIVERIES

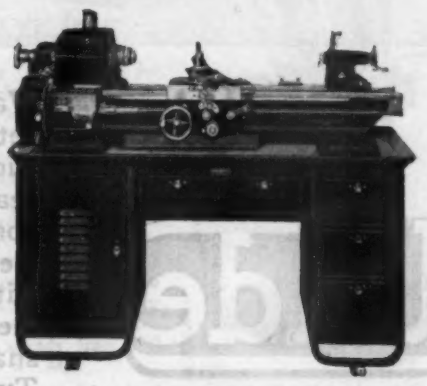
Exclusive Selling Agents

H. LEACH MACHINERY CO.

337 CHARLES ST. PROVIDENCE, R. I.

Agents in all Principal Cities Throughout the World

SHELDON



BACK GEARED, SCREW CUTTING SHELDON PRECISION LATHES

1" Collet Capacity 11¼" Swing

The SHELDON 10" x 1" series Precision Lathes, combine the advanced features of *extra* collet capacity (1-inch), *extra* swing (11¼ inches), an *efficient* 4 speed, V-belt underneath drive, and a commodious steel cabinet base. The headstock spindle and spindle bearings are larger and heavier than is standard for 10-inch lathes giving not only increased production capacity but also assuring permanency of this lathe's extreme accuracy. SHELDON 10" x 1" Lathes have full quick change gears, a worm feed apron with power cross feed and every other essential feature of a quality machine tool, still are surprisingly low in price. *Write for Catalog.*

SHELDON MACHINE CO., INC.

4234 N. KNOX AVENUE CHICAGO 41, ILL., U.S.A.

A New Way to Cut Burring Costs

Sheet Alclad 1" to 60" wide automatically burred at maximum surface feed of 200 feet per minute . .

Burrs ALL METALS from .020" to .250" thick

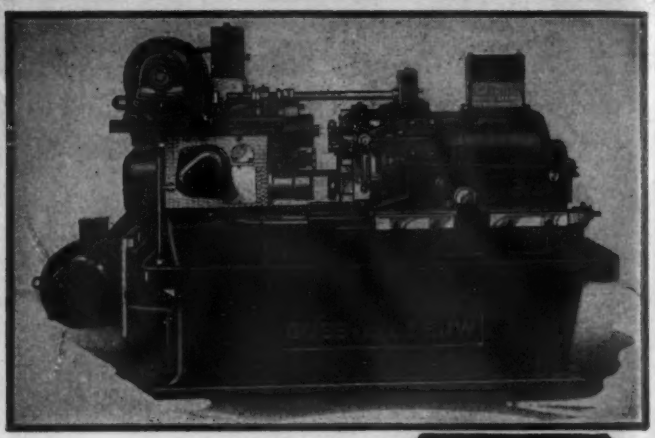
Yoder BURR-PLANER

A simple automatic machine which cuts burrs to within .001" to .005" . . . rolls down balance . . . leaves holes in working condition after one pass. Savings in time as high as 85% have been made in aircraft work, where it has been thoroughly production-tested. Prompt deliveries. Write for descriptive bulletin.

THE YODER COMPANY

5500 WALWORTH AVE. • CLEVELAND 2, OHIO

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES



WORK ROTATING TYPE
5 Spindles
6 Spindles
8 Spindles

Features include:

Lead Screw Threading on both types—Preloaded Anti Friction Spindle Bearings—Hardened Ways—Oversize Spindles—Gears of Chrome-nickel steel, carefully heat-treated.

Write for copy of descriptive catalog giving complete, detailed specifications.

TOOL ROTATING TYPE
4 Spindles
5 Chucking Positions

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

MILLHOLLAND

Automatic DRILLING - BORING MILLING - TAPPING *Units*

½ to 20 HORSEPOWER DRIVE

AUTOMATIC and SEMI-AUTOMATIC PRODUCTION MACHINERY

W. K. MILLHOLLAND MACHINERY CO.
Indianapolis, Ind.

ABRASIVE

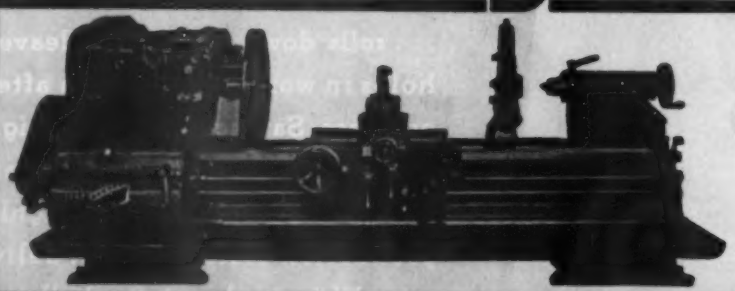
ACCURACY BOOSTS PRODUCTION

No. 1G	INTERNAL GRINDER	No. 34	VERTICAL SPINDLE SURFACE GRINDER
No. 1½	HAND FEED SURFACE GRINDER	No. 3B	AUTOMATIC FEED SURFACE GRINDER

Look for Our Full Page Advertisements

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, RHODE ISLAND

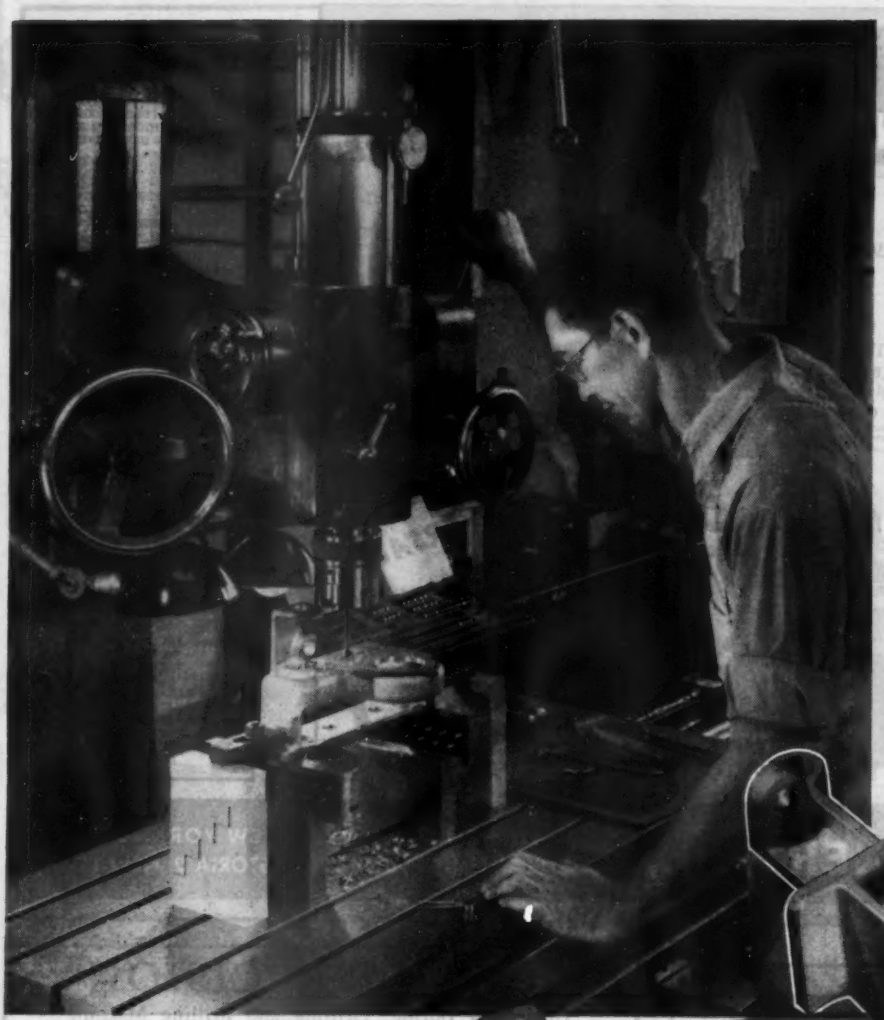
SPRINGFIELD GEARED HEAD LATHES



for peacetime or war production!

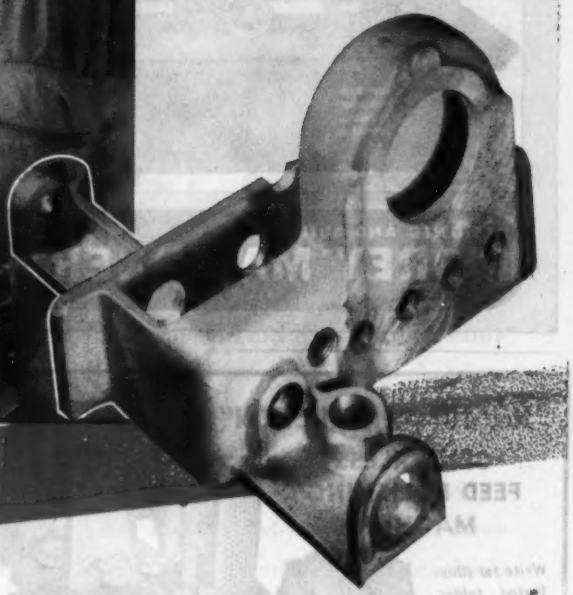
A lathe purchased now, for round-the-clock war production, must still meet peacetime requirements. Therefore, specify SPRINGFIELD lathes—flexible, efficient, ideal for emergency or normal production. SPRINGFIELD lathes are built in sizes from 14" to 30". Write for descriptive bulletins, prices, deliveries, etc.

The SPRINGFIELD MACHINE TOOL COMPANY • • • SPRINGFIELD, OHIO, U.S.A.



Cleereman Jig Borer producing a small lot order at low cost.

Holes in this aluminum casting range from No. 40 to 2⅝" dia.



+0.0003 -0 ON A Cleereman JIG BORER

Here is another example of low cost, small lot production on a Cleereman Jig Borer. The part is an aluminum drive casting in which 21 holes are finished, five being counterbored and two threaded. Without jigs or fixtures, tolerances on most of the holes are held to 0.0003,—0.0000.

You, too, can have the advantages of high efficiency, speed of operation, unexcelled accuracy, extreme range of adaptability, and long working life by installing Cleereman Machines.

Write today for catalogs on Cleereman Jig Borers, Cleereman Box Column Drilling Machines, and Cleereman Round Column Drilling Machines.

ADDRESS—

BRYANT Machinery & Engineering Company

400 WEST MADISON STREET
CHICAGO 6, ILLINOIS

AFFILIATED WITH

CLEEREMAN MACHINE TOOL CO. MANUFACTURER OF PRECISION JIG BORERS & DRILLING MACHINES

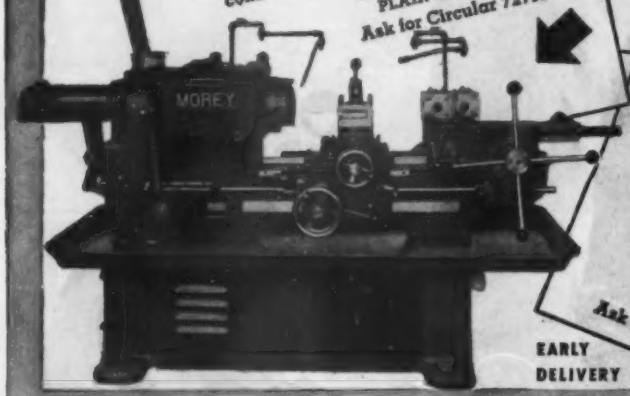
MOREY TURRET LATHES
for BAR or CHUCKING { UNIVERSAL or PLAIN

#3 UNIVERSAL
For bar stock up to 1½" in diameter
10" turning length
15½" swing over bed
Infinite spindle speeds: 55 to 1800 RPM. constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 727A

#2 PLAIN-GEARED
For bar stock up to 1" in diameter
Turning length 8½"
Swing over cross slide 6"
Swing over bed 14"
Infinite spindle speeds:
Minimum of 60 RPM.
Maximum of 2000 RPM.
Constant horsepower at all speeds.
Ask for Circular 629A

#4 UNIVERSAL
For bar stock up to 2" in diameter
12" turning length
19½" swing over bed
Infinite spindle speeds: 35 to 1500 RPM. constant speed motor, 1200 RPM
AVAILABLE ALSO WITH PLAIN CROSS SLIDE
Ask for Circular 736A

EARLY DELIVERY



- INFINITE SPINDLE SPEEDS —Electrically Selected—
- DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS ELIMINATES GEAR MARKS (patents applied for).
- GEARED SPINDLE SPEEDS INSTANTLY AVAILABLE THROUGH MULTIPLE DISC CLUTCHES.
- SPINDLE MOUNTED ON TIMKEN BEARINGS.
- RIGID—WITH SUFFICIENT POWER TO TURN AT THE HIGHEST SPEEDS AND FEEDS MODERN TOOLS WILL WITHSTAND.
- SPINDLE SPEEDS AND POWER FEED CHANGES WITHIN EASY REACH OF OPERATOR.

ARMY NAVY

THE DESIGN OF THE MOREY No. 2, 3 and 4 TURRET LATHES ARE BASICALLY ALIKE. EACH MACHINE IS ENGINEERED FOR THE SIZE WORK IT IS DESIGNED TO HANDLE.

DESIGNED AND BUILT BY
MOREY MACHINERY CO., INC
410 BROOME STREET, NEW YORK 13, N. Y.
PLANT: 4-57 26TH AVE., ASTORIA 2, NEW YORK

No. 101 "PRODUCTION" CENTERLESS FEED POLISHING MACHINE

Write for illustrated folder.

No centering, chucking or holding, just . . . feed automatically!

Work of superior quality can be produced on this machine even in the hands of inexperienced operators. It is adaptable to polishing, finishing and buffing any cylindrical work to whatever degree of finish required. Better finishing at lower cost is assured.

Features include: a sturdy wheel head, a simple wheel trueing device for use with wheels in motion, a patented centerless feed and an adjustable work support. All parts are guarded but easily accessible. Handles work from ⅛" to 6" diameter.

PRODUCTION MACHINE CO.
Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.
GREENFIELD, MASS., U. S. A.

LUCAS "PRECISION"
Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.
NOW AND ALWAYS OF
CLEVELAND
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LELAND-GIFFORD COMPANY · WORCESTER MASS. U.S.A. · MACHINE TOOLS · CRANK SHAFTS

Drilling and Tapping Machines
(Automatic and Semi-Automatic)
LELAND GIFFORD CO.
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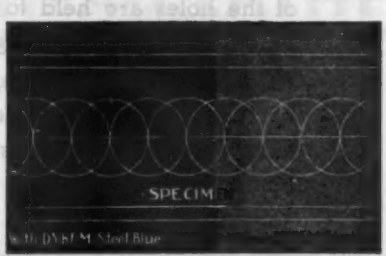
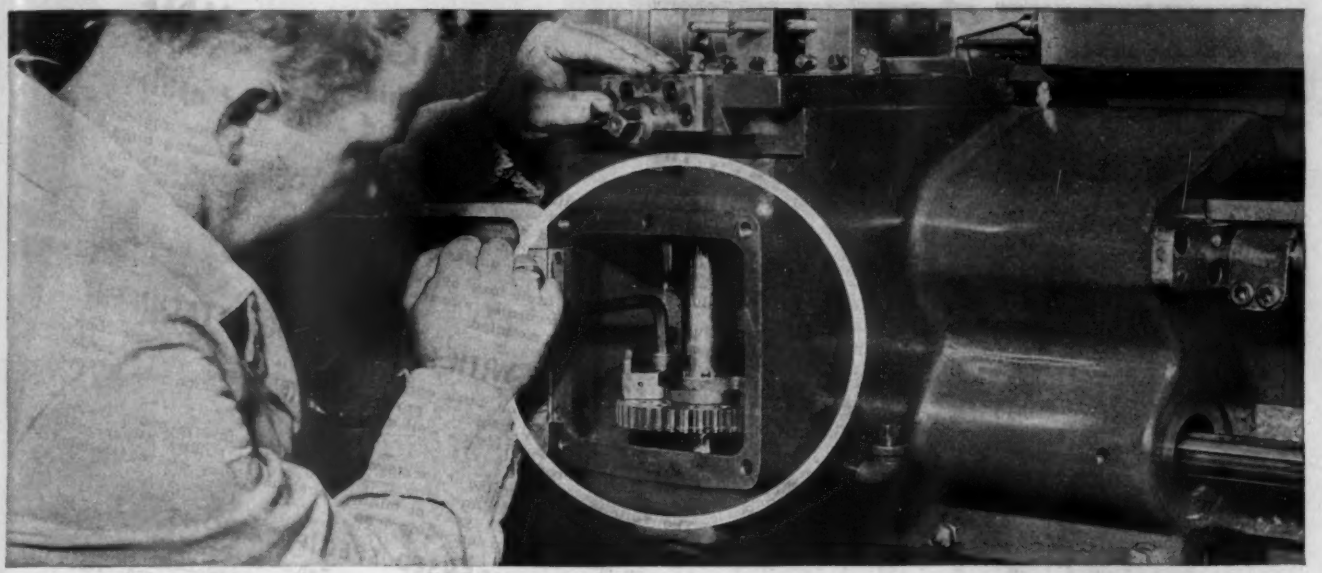
DYKEM STEEL BLUE
STOPS LOSSES
making dies & templates



simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

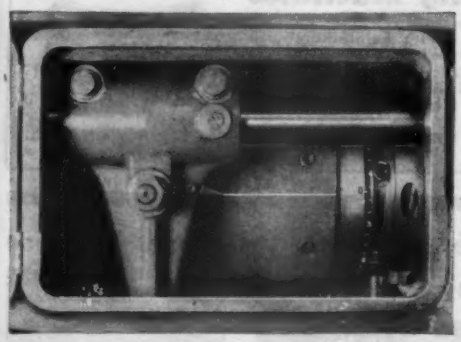
Write for full information
THE DYKEM COMPANY, 2301 B N 11th St., St. Louis, Mo.
In Canada: 444 Pacific Ave., Toronto, Ont.

ONLY *Lo-swing* AUTOMATIC LATHES



HAVE THIS *Quick Change-Over Mechanism*

Close-up view of Simplified Change-Over Mechanism.



Close-up view of drum cam showing index line and graduated adjustment ring.

● War production plants appreciate the speed and simplicity with which Lo-swing Automatic Lathes can be changed-over from job to job. Take Model LR for example: A hinged door provides easy access to the Simplified Change-Over Mechanism located on carriage front. Simply loosen two cap screws and move gear segment to graduation on scale corresponding to desired length of cut in inches. Tighten cap screws and carriage is timed for the job at hand. Cam is standard and does not have to be changed, and since the cycle is closed and locked, machine cannot get out of time.

Rapid traverse adjustment is accomplished with equal ease and speed thru the hinged door at the head end of machine. Loosen two cap screws and slide the ring which is graduated in inches around until the length of cut desired in inches is opposite the zero mark. This automatically positions the rapid traverse control cams so that the remainder of the cycle is completed in rapid traverse. A Rapid Traverse Control Handle, conveniently located just below the door opening, further facilitates this adjustment and reduces change-over time.

These and other Lo-swing features, developed in the peace-time past, are proving their value under the stress of war production.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

LATHE NEWS *from* SENECA FALLS

Bridgeport

TURRET MILLING MACHINE
. . . the all-purpose machine with unparalleled range of utility

This machine will mill, drill, bore and shape at all conceivable angles. All angular settings in one plane are achieved by merely turning hand wheel controlling keyed overarm. It has always been furnished with the well known Bridgeport High Speed Milling Attachment which provides for drilling and boring at all angles without changing work setup.

Column, knee and table are of rugged construction. Wide ways and taper gib assure accurate, vibration-free operation. Entire machine is anti-friction bearing mounted.

NOW EQUIPPED WITH NEW SHAPING ATTACHMENT

This new attachment on back end of overarm is of sturdy construction and can be set at all angles. It provides for shaping such work as large and small dies and molds as well as for intricate production jobs involving slotting operations.

The "Bridgeport" Shaping Attachment is now available to every owner of Bridgeport Turret Milling Machines. Shaping and Milling Attachments can be mounted on all types of milling machines. They are in extensive use on special production equipment.

CONDENSED SPECIFICATIONS

Longitudinal Feed—26" Table—9" x 32"
Cross Feed—9" Spindle Speeds—(Milling Unit) 275, 425, 700, 1050, 2100, 4250
Vertical Feed of Knee—16"

WRITE FOR ILLUSTRATED BULLETINS GIVING FULL DETAILS

THE BRIDGEPORT MACHINES, INC.
Bridgeport, Conn.

M M

REID Hand Feed Surface Grinder No. 2C

Our dealers will help you fill out necessity priority forms. Write us today for your nearest dealer's name and address.

Equipped with Motorized Spindle

A Proven Product for Over a Quarter Century with Thousands in Use Daily

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EXCELLENT DELIVERIES

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Agents in all Principal Cities Throughout the World

Giant KEYSEATERS

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

MITTS & MERRILL
913 Tilden St.
Saginaw, Michigan

Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002" limits. Ask for special bulletin—also circulars on Drill Grinders, Point Thinners, Tool and Cutter Grinders, Face Mill Grinders and Tool Bit Grinders.

OLIVER OF ADRIAN PRODUCTS

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.

Why the Vertical Roto-Matic Will Increase Your Drilling Production

. . . is explained in this
FREE BOOKLET

The ROTO-MATIC principle of continuous operations will enable you to drill, ream, bore, face, mill, etc., more parts in less time. Write for this booklet today; learn the many advantages of the ROTO-MATIC and how it can be specifically applied to your work. Ask for Bulletin No. C-100.

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Mfrs. of Machine Tools and Micrometers
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10,000 R.P.M.
tapping in Brass

with WINTER High Speed TAPS

That's the performance record one manufacturer of brass products tells us about his WINTER High-Speed Taps.

Our engineers recommended the WINTER Taps used for the job. According to the manufacturer, his tapping machines ran continuously, at a speed of 10,000 RPM — tapped and reversed perfectly.

Any tapping job may be done, today, with amazing speed and efficiency, with WINTER High-Speed Taps.

FOR BEST TAPPING RESULTS

- Pick the RIGHT tap for the job.
- Use a tap with properly designed cutting edges.
- Lubricate properly, with the RIGHT oil.
- Handle with care, ALWAYS.
- Keep cutting edges properly sharpened.
- Let WINTER Engineers recommend the taps to solve your threading problems.

A DIVISION OF THE NATIONAL TWIST DRILL & TOOL CO., ROCHESTER, MICHIGAN

Winter Brothers

COMPANY
BRANCH STORES

Wrentham, Massachusetts, U.S.A.
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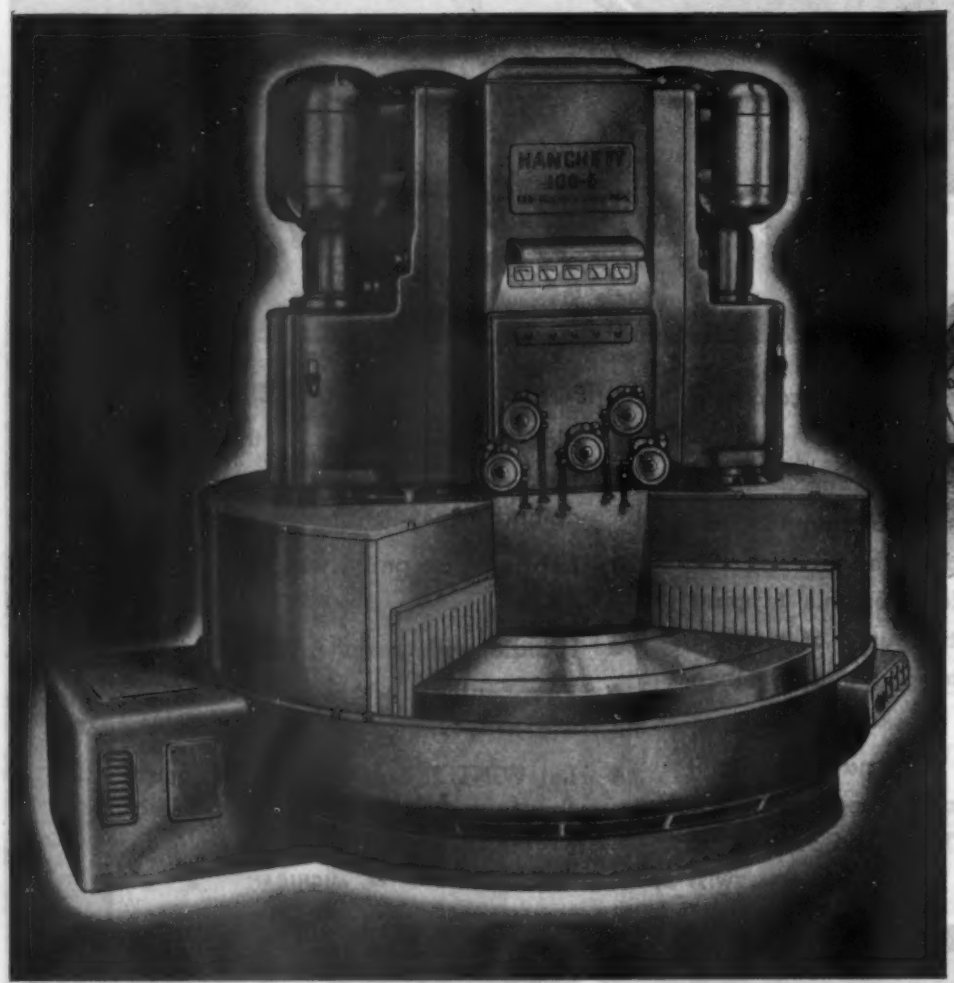
ALREADY "OF AGE"

50 YEARS AGO

1894

Back in '94, Hanchett was already "of age" — with 21 years' practical grinding machinery experience to its credit, and a fine reputation for precision products. Today, Hanchett's record of steady growth is recognized by the trade. For this company's advancements have always been a step ahead of the times—designed to meet both present and future production needs. Most recent is the new Hanchett No. 100 Rotary Surface Grinder—a high-speed, large-capacity, precision machine that takes five cuts (from roughing to finishing in one pass) with automatic worksize control. And this is only one of many.



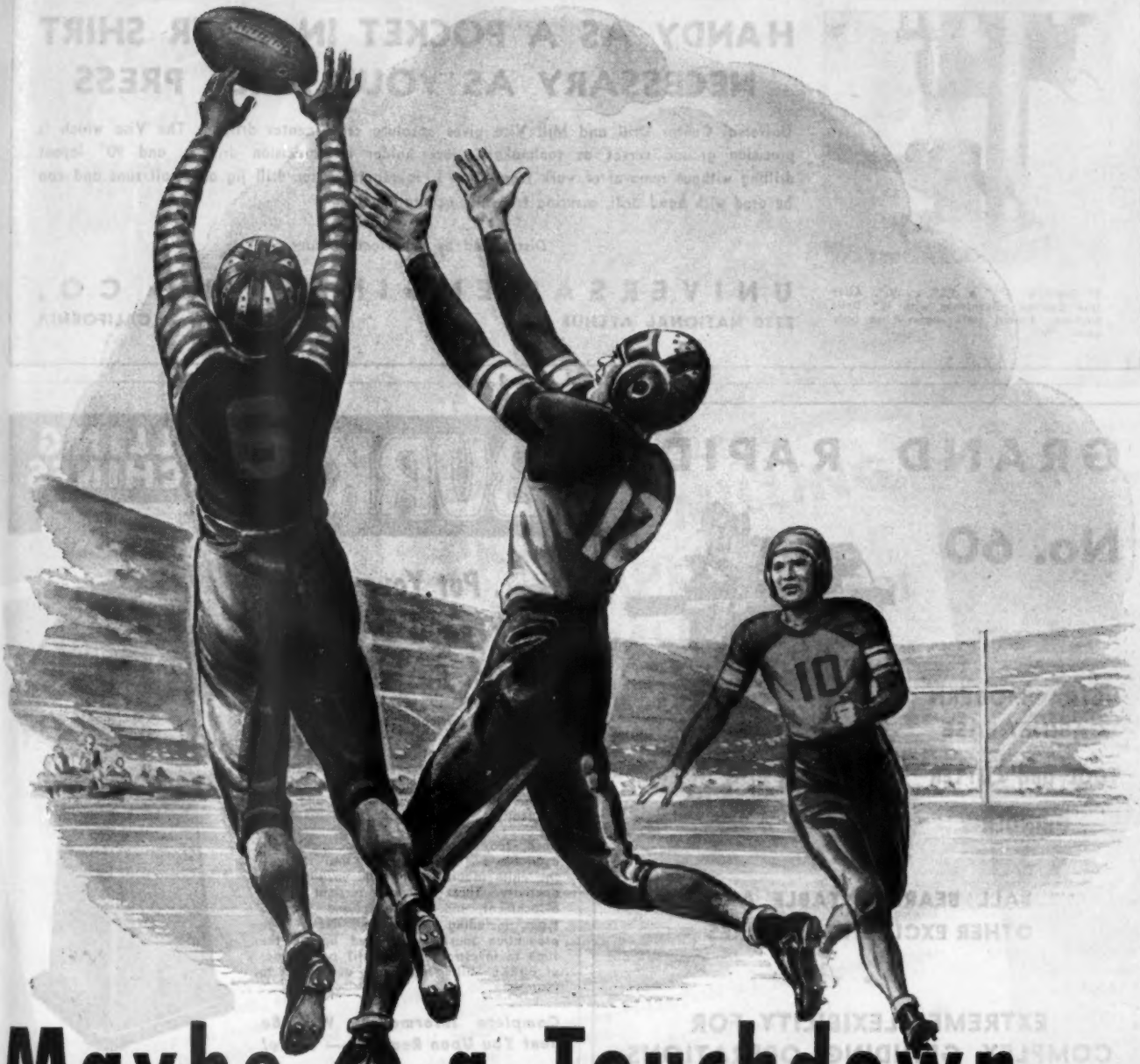
1944

WRITE TODAY for BULLETIN No. 170 A-13

HANCHETT GRINDERS
BIG RAPIDS MICHIGAN

IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO.
BIG RAPIDS, MICHIGAN U.S.A.



Maybe a Touchdown

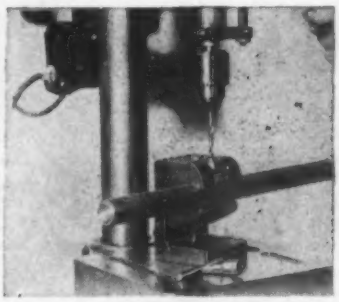
Hamilton Steam and Diesel Engines, Cannon and the Machine Tools to make them.

BUT KEEP THAT GUARD UP!

GENERAL MACHINERY CORPORATION

HAMILTON, OHIO

THE NILES TOOL WORKS COMPANY • THE HOOVEN, OWENS, RENTSCHLER CO. • GENERAL MACHINERY ORDNANCE CORPORATION



2" Capacity, 4⅛" x 3¼" x 3¼". Alloy Iron Casting. Furnished with ⅛" Drill bushing. Layout scale engraved on body above "V".

HANDY AS A POCKET IN YOUR SHIRT NECESSARY AS YOUR DRILL PRESS

Universal Center Drill and Mill Vise gives absolute cross center drilling. The Vise which is precision ground serves as toolmaker's work holder for precision drilling, and 90° layout drilling without removal of work from vise. It is adaptable for drill jig on small runs and can be used with hand drill, assuring true and accurate holes.

Distributed by your local dealer:

UNIVERSAL ENGINEERING CO.
2230 NATIONAL AVENUE SAN DIEGO 2, CALIFORNIA

GRAND RAPIDS No. 60

ULTRA MODERN CABINET BASE

TOOL and CUTTER GRINDER

with

BALL BEARING TABLE AND OTHER EXCLUSIVE FEATURES

* * *

EXTREME FLEXIBILITY FOR COMPLEX GRINDING OPERATIONS

GALLMEYER & LIVINGSTON CO.
330 Straight Ave. S. W., Grand Rapids 4, Mich., U. S. A.

BURKE MILLING MACHINES

. . . Put Your Small Work on a Production Basis!

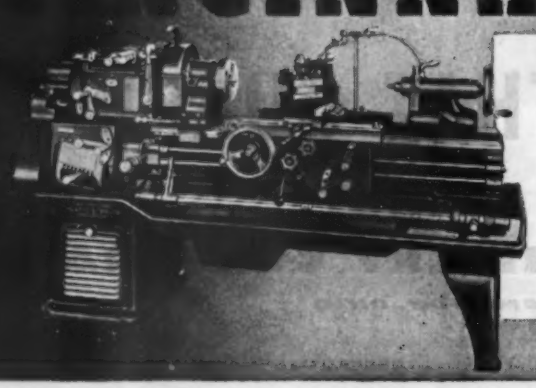
Those small, difficult jobs can be handled on a *production basis* with BURKE Motor Driven Milling Machines Nos. 1, 2, 3, & 4. Primarily, this is because BURKES have been *specially designed and built* to do smaller milling jobs efficiently and economically.

Then, too, a number of attachments are available . . . attachments that increase the units usability, and add to your productivity. These include a vertical milling attachment, index centers, and vises—3 types, including swivel base. Now, when production must be stepped up, is the time to investigate the profit possibilities of BURKE Milling Machines, as applied to your work.

Complete Information Will Be Sent You Upon Request — Write!

BURKE MACHINE TOOL CO.
CONNEAUT · · · OHIO

CINCINNATI LATHES



Modern—Simple—Sturdy and Accurate

These modern lathes cut costs, eliminate scrap loss and are much easier for operators to handle. Their simplicity of design assures better and more accurate work. They can be depended on to handle maximum production at minimum cost, and can be tooled to meet specific requirements quickly and economically. Produced in sizes from 14" to 30" inclusive. Send for complete details.

THE CINCINNATI LATHE & TOOL CO.
Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio

GORTON

SPECIALISTS FOR OVER 30 YEARS IN

Tracer-Controlled MILLING

PROFILE MILLING SIMPLIFIED ...by TRACER CONTROL

Two Operations in a Single Setup without Changing Tools

• A prominent airplane engine manufacturer cut production costs, saved tying up expensive machinery and conserved skilled workmen by profile milling this radius of an engine crankshaft section on the Gorton Duplicator. Semi-skilled help operated this machine, obtaining smooth finish on the profiling of the irregular channel contour (1) on the part shown at right, and the milling of the channel (2) below this contour.

The Duplicator was set up with a special master in order to eliminate changing tools or resetting the work. A special fixture was used to hold the work at an angle to allow cutter access in milling the channel.

The Gorton Duplicator is the ideal machine for handling jobs like this where uniformity in quality and high precision repetition of all dimensions is required.

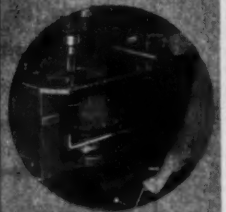
PRODUCTION DATA

Operations—Profile Mill .369" Radius and Mill Channel.
Machine—GORTON 9-J Super-Speed Duplicator.
Part—Rear of Crankshaft—Steel.
Cutter—Special .738" dia. Ball Cutter—4 Flute.
Holding Method—Special Fixture.
Feed—Manual.
Spindle Speed—500 r.p.m.
Stock Removed—⅛".
Floor-to-Floor Time—15 minutes per piece.

GORTON ENGINEERING SERVICE—

You are invited to consult Gorton engineers, without obligation, on your next production profile milling jobs. Gorton "Tracer Control" may give you the simplest, practical answer to lower cost production. Please submit part, print or specifications to your nearest Gorton Dealer or to the Gorton Factory at Racine, Wisconsin.

The *Right* Size The *Right* Type of Machine for Every Job...
From 2 oz. to 2 ton DIE BLOCKS



Tracer-Controlled MILLING

Tracer-Controlled DUPLICATING

Tracer-Controlled ENGRAVING

Tracer-Controlled ETCHING

GORTON'S ARMY-E NAVY

GORTON *Precision* MACHINES

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George Gorton Machine Co.,
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CARLTON RADIAL DRILL

FEATURES — 1. Low Hung Drive to the Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all speeds. 4. Concentrated and Convenient controls. 5. Constructed on Unit Principal.

The CARLTON

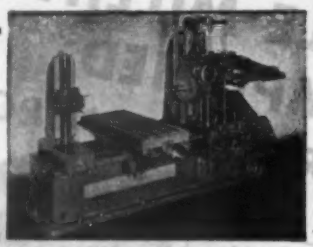
ARMY E NAVY

MACHINE TOOL COMPANY

CINCINNATI, OHIO, U. S. A.

UNIVERSAL *Horizontal Boring Machine*
The only TRIWAY *Boring Machine Built*

Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.



Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.
Hudson, Mass., U. S. A.

ROCKFORD MACHINE TOOL CO.

Hy-Draulic

Shapers . . Planers . . Slotters . . Shaper-Planers
ROCKFORD, ILLINOIS, U. S. A.

SMITH & MILLS
CRANK SHAPERS
sizes 12" to 32" stroke
THE SMITH & MILLS CO. Cincinnati, Ohio

TO IMPROVE PERFORMANCE . . .
equip your surface grinders with

MASTERDRIVE

. . . it's simple
. . . it's complete

By eliminating complicated pulley arrangements and costly line-shaft maintenance, Masterdrives power surface grinders for maximum efficiency and economy.

Masterdrives for surface grinders are engineered as complete units ready to install. No machine work needed. Proper belt tension is maintained at all times.

For information on Masterdrive for your grinders, simply state the make. Masterdrives are supplied in 750 specifications for practically every machine tool drive requirement. Phone, write, or wire today!

THE MASTER ELECTRIC COMPANY
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JUST 20 SECONDS
FOR SMALL DRILLS FROM No. 70 TO 15/64"

Tombill Drill Sharpener is speedy and economical. An inexperienced operator can grind exactly the right degree on drills from No. 70 to 15/64". Write for folder.

MERCURY PRODUCTS CO.
423 EUCLID AVENUE
CLEVELAND 14, OHIO

IT PAYS TO *MULTIPLE* DRILL OR TAP SMALL PARTS LIKE THESE

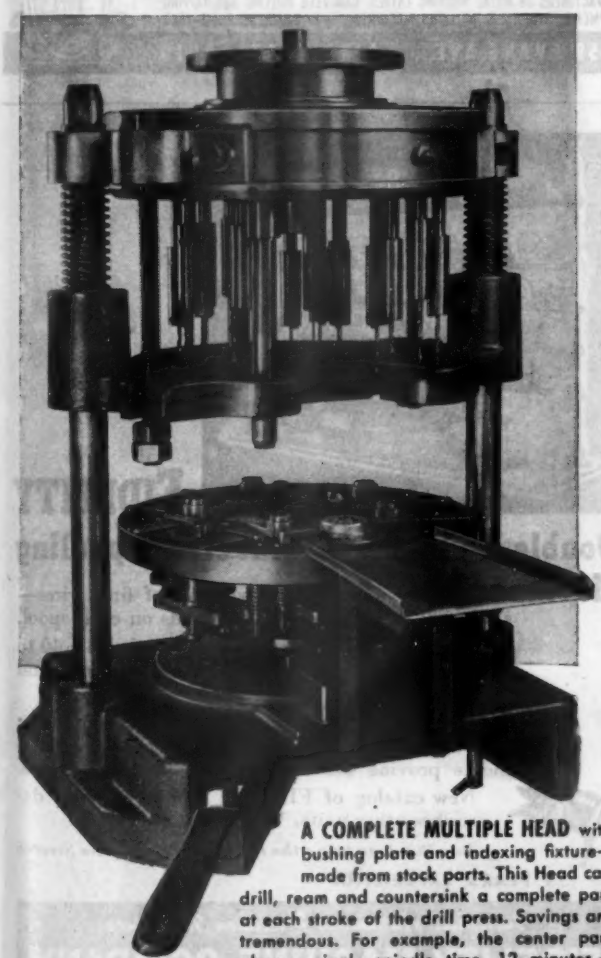
TYPICAL PARTS which require the Ettco-Emrick Multiple Head with standard *INDEXING* fixture —one of a dozen different standard work handling methods. Part at left: 54 holes including counterboring. Center: 16 holes including counterboring. Right: 15 holes including reaming and counterboring. Parts are fed in a nest, automatically clamped and drilled and automatically ejected if desirable. Indexing can be by hand or air.

..Let Ettco-Emrick give you the answer!

Multiple drilling or tapping small parts is a specialized engineering job. The methods for doing this work, differ greatly from single spindle operation. For example, for certain types of parts, the **indexing** method illustrated gives highest production at low cost. Unless you know these methods it is hardly possible for you to work out the best way to handle a particular small part job.

Ettco-Emrick has specialized in this field for years and has developed the Ettco-Emrick Multiple Spindle Head System which provides both the handling method and the equipment for obtaining fastest production on any particular part. It also represents lowest equipment cost because Ettco-Emrick Multiple Spindle Heads are made from standard stock parts and can be used on any standard drill press.

You'll save a lot of time and trouble if you will send a drawing or sample of the particular small part you want to multiple tap or drill, to Ettco-Emrick for recommendations, **before** you decide on how you are going to do the job. Engineers of many of the biggest name firms in American Industry are doing this regularly. They have learned it pays.



A COMPLETE MULTIPLE HEAD with bushing plate and indexing fixture—made from stock parts. This Head can drill, ream and countersink a complete part at each stroke of the drill press. Savings are tremendous. For example, the center part above — single spindle time, 12 minutes — Ettco-Emrick Indexing Head time, 30 seconds including loading and unloading.

ETTCO TOOL CO.

590 Johnson Ave., Brooklyn 6, N. Y.

DETROIT 1 • *CHICAGO 6*

Over 25 years specialization in solving industry's drilling and tapping problems

SAVE *Critical* TIME!

TIME CANNOT BE SALVAGED

Once it's gone there's no reclaiming it. But you can cut your finishing time 'way down with Haskins Flexible Shaft Equipment. Forget old hand-finishing methods. Your men will work faster and better, with less fatigue, the Haskins way. Every hour will see increased production. Man-hours—plus machine-hours—will really mean something. For important new time-saver methods, send for your copy of Catalog 45. R. G. Haskins Company, 2760 W. Flournoy Street, Chicago, Illinois.

H-6

1/2 H.P. Countershaft drive, 4-speed —900—3400 R. P. M. Bench height pedestal mounting, 360 degree swivel.

HASKINS
Flexible Shaft
EQUIPMENT

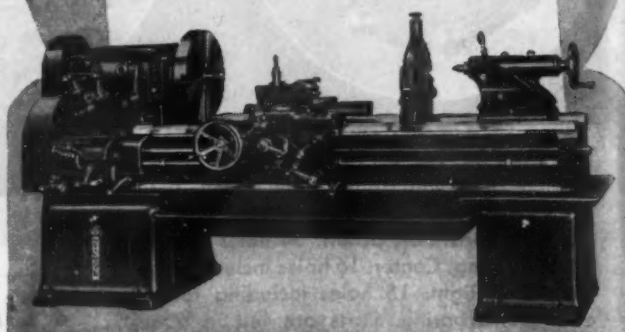
More VERSATILE Machines for More PROFITABLE Work

Metalmaster

12", 14" & 16" LATHES

Offer: Infinite range of threads and feeds. Easy gear adjustment. Independent motor mounting. Short, direct drive. One control for all threads. Ample power for heaviest cuts. Automatic stop for feeds.

Catalogs sent on request. Write for yours!



The **BRADFORD MACHINE TOOL Co**

MANUFACTURERS OF METAL WORKING LATHES; CAM FEED DRILLING AND TAPPING EQUIPMENT, HYDRAULIC DRILLING MACHINES . IN BUSINESS SINCE 1840

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Double-End Screw Traverse Spooling Machine . . .

For multiple-end winding of fine wires—sizes .008 to .030 up to twelve ends on each spool.

Delivers a smooth, uniform lay at speeds from 40 to 800 feet per minute—depending on size and kind of wire.

Tension and brake control prevent overrunning; slow acceleration avoids wire breakage, and adjustments provide for various wire sizes and types.

New catalog of FIDELITY Wire Spoolers describes other units. Write for it.

Buy Bonds to bring the boys down the Home Stretch

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Intricate, Automatic Precision Machines

FIDELITY MACHINE COMPANY

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TIPS for Lathe and Grinder CENTERS made of COLMONOY No. 6

In addition to supplying COLMONOY Center Tips, we are now in position to provide complete retipping service on centers.

This service consists of casting tips of COLMONOY NO. 6 and applying them to your centers by the use of Silver Solder or a low temperature brazing alloy. By the use of this method your worn or used high speed steel centers can be salvaged, and such reclaimed COLMONOY tipped centers will outlast and outwear new, untipped centers.

Charges for this work are moderate. Prices of tips and the costs of application are given in Bulletin CT-1, which will be mailed on request.

WRITE FOR BULLETIN CT-1

General Catalog Describes other Colmonoy products.

WALL · COLMONOY CORPORATION

720 Fisher Building · Detroit 2, Michigan

IT WAS A RUNAWAY

In Comparative Productive Capacity with CORTLAND CHUCKS and SEGMENTS

Another War Production Test result is in—with Cortland Chucks and Diagonal Shearing Segments running far ahead of a competitive brand . . . Cortland producing more at less cost.

TEST FACTS: A large maker of ball bearings . . . using a Blanchard No. 18 Vertical Surface Grinder. Wheel Speed 720 R.P.M.

WORK: Ball Bearing side plate retainer. S.A.E. 52100 Steel hardened to 64 Rockwell "C" scale. 4.472 sq. in. surface ground per piece, 57 pieces per table load.

AND HERE ARE THE RESULTS:

Detail	CORTLAND Chuck and Segments	*Competitive Segments Formerly Used*
Cubic inches of stock removed per inch in height of segments	588.4	350.6
Ampere readings	15	30
Dressings necessary	1	2
Work heat	No	Slightly
Grinding time	3 min. 47 sec.	8 min. 50 sec.

Notice the vital savings accomplished by Cortland: Ampere Readings cut in *half*; one dressing instead of two; *cool* grinding; and production completed in 43% of the time required formerly. Naturally these results brought a substantial order for Cortland *Diagonal Shearing* Segments.

You may obtain comparable improved results and lower costs from Cortland Chucks and Segments. Why not write for latest illustrated bulletin giving the complete story of Cortland performance.

CORTLAND GRINDING WHEELS CORP.
5 Cortland Street Chester, Massachusetts

Diagonal Shearing with Varying Contact Means Better Surface Grinding

A true segment, the grinding surface has narrow ends that *start* the work with minimum shock and resistance. Straight inner edge of segment passes diagonally across work with a *shearing* action that *cuts* and *removes* the metal. Varying contact area insures longer exposure to coolant—decreases heat—reduces segment wear—conserves power.

CORTLAND
Chucks and Segments

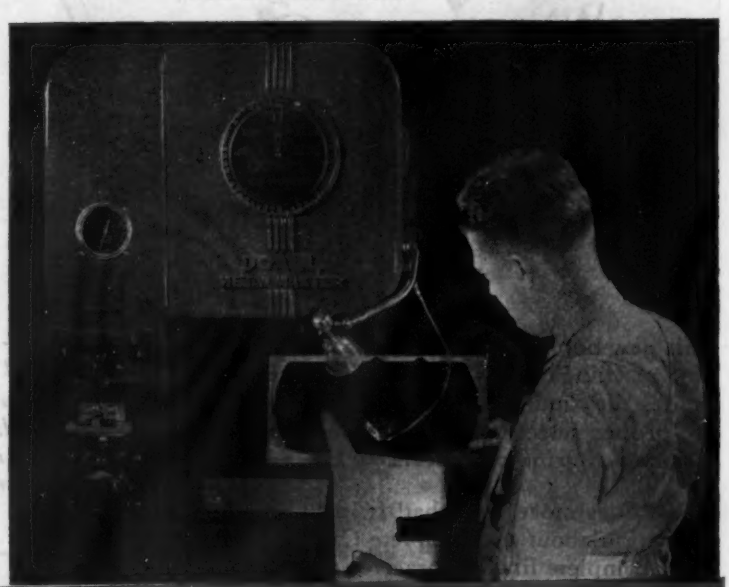
Why "NIBBLE" Templates?

DoALL

MAKES THEM FASTER and SMOOTHER

The Nibbler has no work table. Job must be carefully guided by hand. Finished edges are rough. Much material is reduced to waste chips. Work thickness is limited to thin plate stocks.

The DoALL's thin cutting blade follows layout lines accurately. Edges are smooth and straight. No metal is wasted. DoALL takes work a foot thick, or you can cut 100 or more shapes at one time from stacked sheets.



The DoALL has cut its way through millions of feet of metals, alloys, plastics, laminates, plywood and composition materials that have gone into war production work.

The DoALL laughs at former cutting records by doing internal and external sawing in 1/4 to 1/10 the time of other methods.

If there is one machine tool that deserves your attention now and after the war, it's the DoALL.

The circular DoALL ADVANTAGES tells a graphic, time-saving story. Send for copy.

DoALL

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CONTINENTAL MACHINES, INC.

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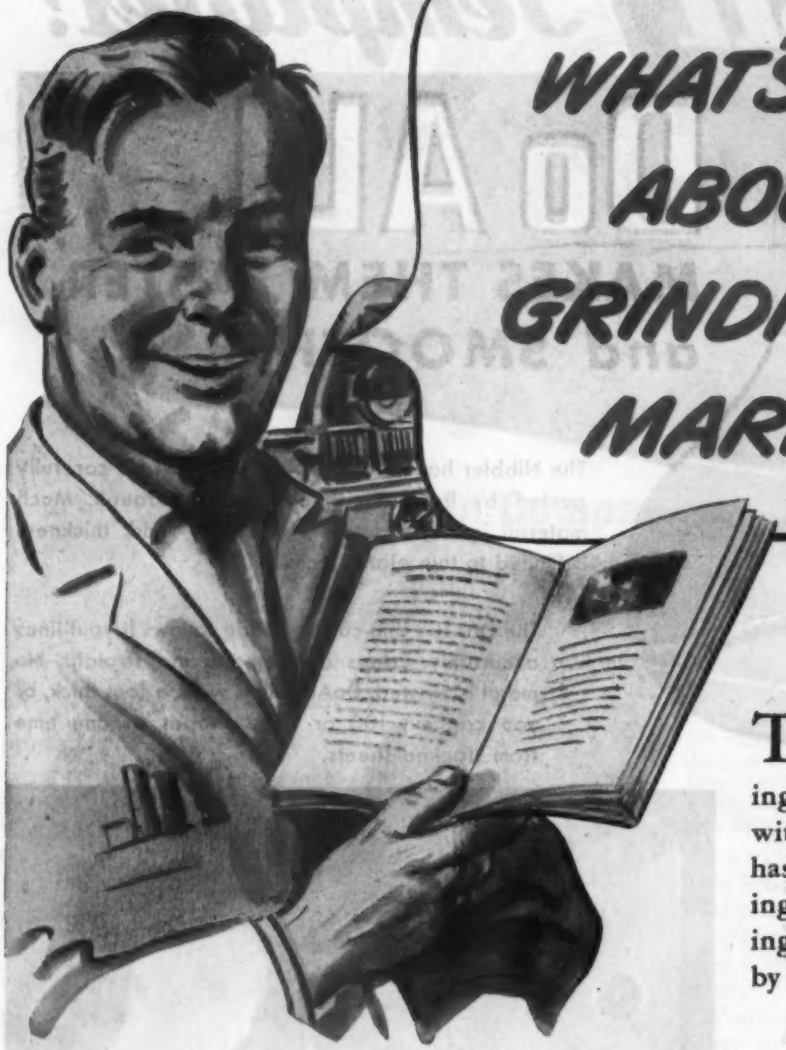


WHAT'S ALL THIS ABOUT NEW GRINDING WHEEL MARKINGS!

THAT'S right—from now on it's going to be a lot easier to get the right grinding wheel for the job! Carborundum, along with all other makers of grinding wheels, has adopted a new system of wheel markings. ✳ The new system is one of marking only. So wheels with similar markings by different makers may not grind alike.

This new book gives you a clear understanding of the new markings on Wheels by Carborundum and the grades they indicate. It's also full of information on the proper selection, identification, specification, use and care of grinding wheels.

But it does more than that! It includes additional information about the complete Carborundum line, the most complete line of abrasives made and sold under one brand name. It is one of the most useful manuals on abrasives ever published! To get your copy promptly, fill out the coupon and mail today to The Carborundum Company, Niagara Falls, New York. And for help with *any* abrasive problem, consult your Carborundum Representative!

✳ *Effective soon, these new markings will appear on all Grinding Wheels sold by Carborundum. Because so many of these wheels are in use in industry, it may take a little while before the transition is complete. For as long as is necessary to help our customers, Grinding Wheels by Carborundum will carry both the old and new markings.*

YOU NEED THIS BOOK TO SELECT THE RIGHT GRINDING WHEEL FOR THE JOB!

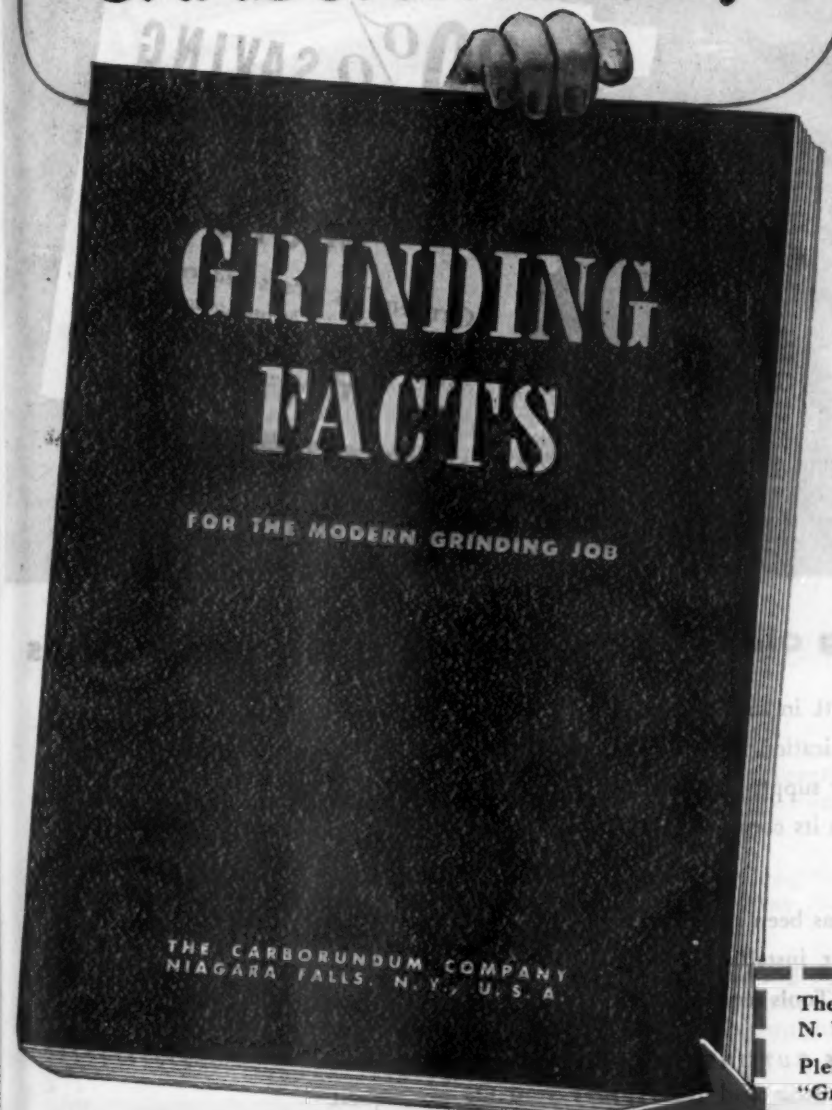
THERE IS A

CARBORUNDUM

TRADE MARK

PRODUCT FOR EVERY ABRASIVE APPLICATION

IT'S ALL IN THIS NEW BOOK BY CARBORUNDUM!



HIGHLIGHTS FROM "GRINDING FACTS"

1. The fundamentals of Wheel Marking
2. The new Carborundum Wheel Markings
3. Factors to consider when selecting a Wheel
4. Care and Handling of Grinding Wheels
5. The 9 Standard Wheel Shapes
6. Basic Grinding Wheel Functions
7. Types of Grinding Operations
8. Diamond Wheels
9. Green Grit Wheels
10. Mounted Wheels
11. Thread Grinding Wheels
12. Cutting-Off Wheels
13. "MX" Wheels
14. Tool Room Sticks
15. Coated Abrasives
16. New Gradings
17. Wheel Speeds

MAIL COUPON TODAY FOR YOUR FREE COPY!

The Carborundum Company, Niagara Falls, N. Y., Dept. AM.

Please send me my free personal copy of "Grinding Facts."

Name.....

Firm.....Title.....

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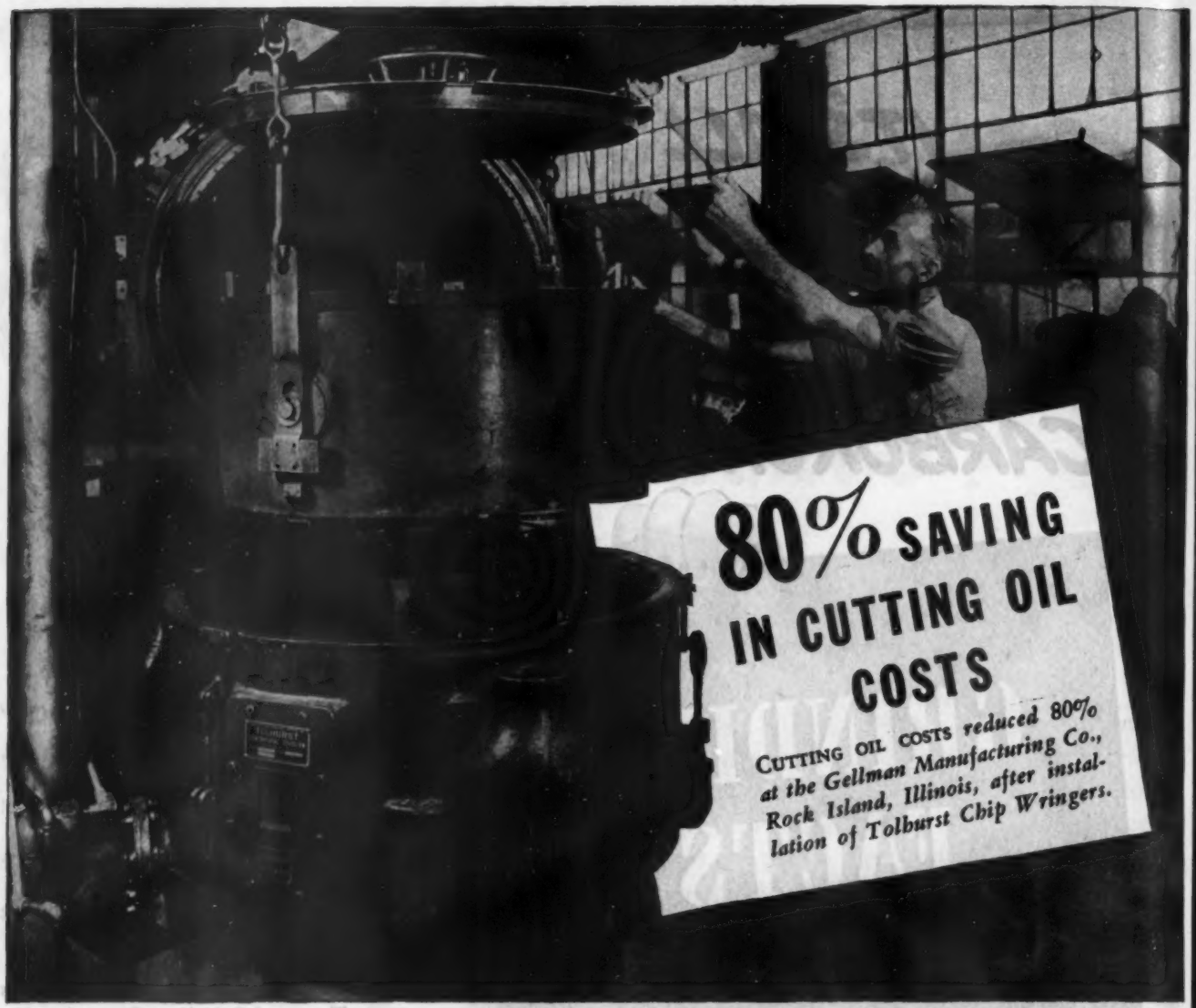
(Carborundum is a registered trade mark of and indicates manufacture by The Carborundum Company)


80% SAVING
IN CUTTING OIL
COSTS
CUTTING OIL COSTS reduced 80% at the Gellman Manufacturing Co., Rock Island, Illinois, after installation of Tolhurst Chip Wringers.

. . Up to 98.6% cutting oil being reclaimed from metal chips

VALUABLE HIDDEN CUTTING OIL in metal chips is reclaimed through the application of centrifugal force. A plentiful daily supply of fresh, reclaimed cutting oil results in its conscientious use by machine operators.

50% INCREASE IN TOOL LIFE has been shown in many tool room records after installing Tolhurst equipment. Tools require less up-keep and fewer resharpenings, consequently production goes on uninterrupted.

OPERATED BY UNSKILLED HELP The routine is simple and rapid. A Tolhurst system of cutting oil recovery raises the standards of plant "housekeeping" because floors are kept cleaner. Also, fire hazards are reduced. Clean chips bring higher scrap metal prices.

ARMY E NAVY

SAVE CUTTING OIL — SAVE METAL

Descriptive bulletin and latest prices available on request

TOLHURST CHIP WRINGERS

TOLHURST CENTRIFUGAL DIVISION • *American Machine and Metals, Inc., East Moline, Illinois*

"Since 1852—CENTRIFUGAL MAKERS FOR THE PROCESS INDUSTRIES"

BROWNSKIN GRIZZLYBEAR

Scores Again!

This colorful illustrated folder tells the experience of the Chrysler Corporation of Canada Ltd. Would you like a copy? It's free.

BATTLE AGAINST THE ELEMENTS — Chrysler Corporation of Canada Limited was faced with this problem of . . . "Corrosion and other deteriorating agencies, making it impossible to transport finished motor parts to the fighting fronts, ready for immediate installation and use."

ANGIER versus CORROSION — Angier Corporation engineers cooperated in the solution of the problem. After studying all the phases of it they recommended A-19 BROWNSKIN GRIZZLYBEAR.

RECOMMENDATION ACCEPTED — Angier scores again and again with its Corrosion Preventive and Waterproof Papers which have revolutionized the packaging of finished steel and precision parts delivered to the war theatres throughout the world.

WRITE FOR FREE FOLDER BAM

ANGIER CORPORATION

CORROSION PREVENTIVE AND WATERPROOF PAPERS

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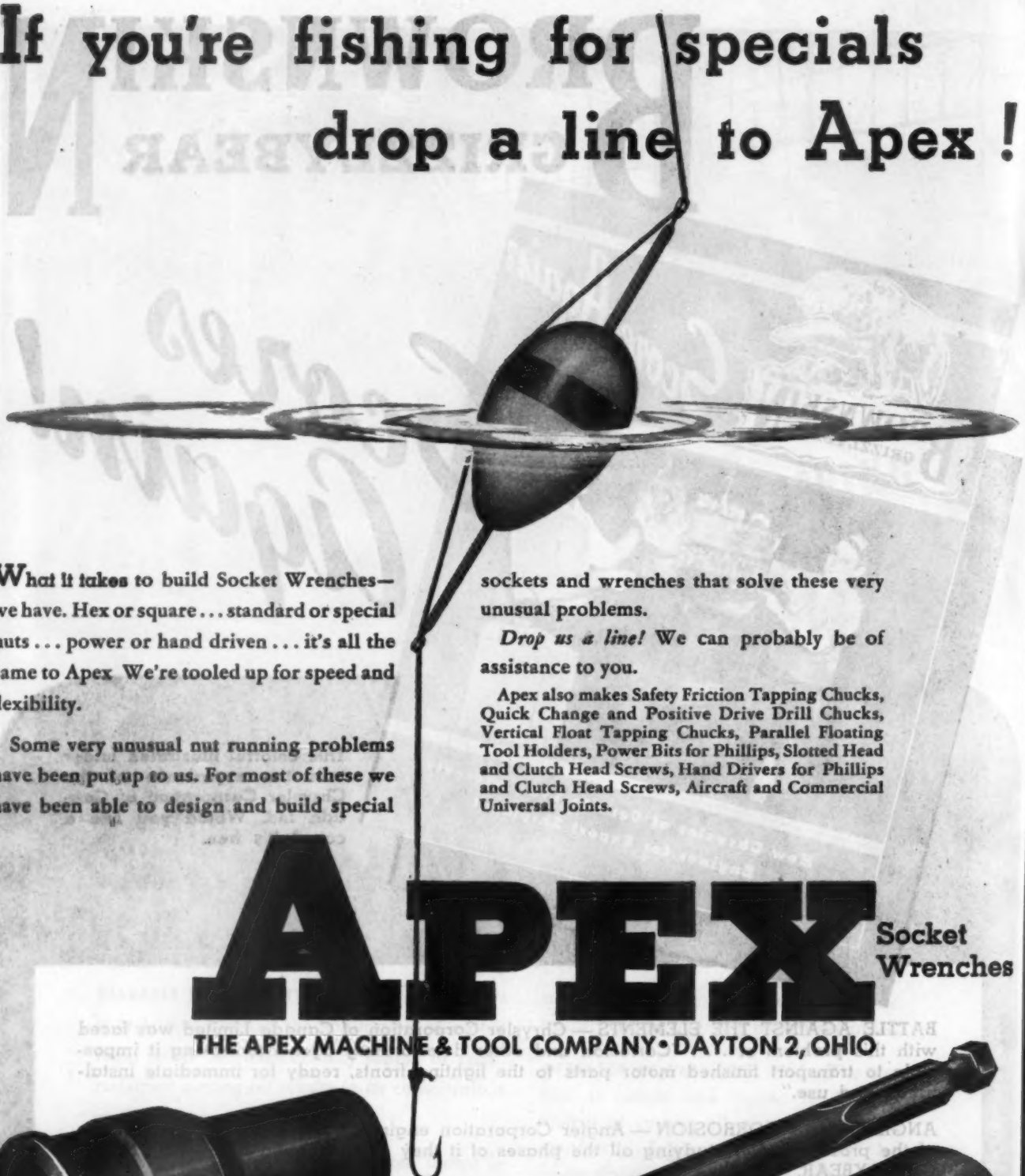
If you're fishing for specials drop a line to Apex !



What it takes to build Socket Wrenches—we have. Hex or square . . . standard or special nuts . . . power or hand driven . . . it's all the same to Apex. We're tooled up for speed and flexibility.

Some very unusual nut running problems have been put up to us. For most of these we have been able to design and build special sockets and wrenches that solve these very unusual problems.

Drop us a line! We can probably be of assistance to you.

Apex also makes Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft and Commercial Universal Joints.

APEX Socket Wrenches

THE APEX MACHINE & TOOL COMPANY • DAYTON 2, OHIO

Cutting oil *News* letter

Practical suggestions from the field on how cutting oils and coolants are being used by midwest machine operators to lick tough wartime jobs.

NOVEMBER, 1944

Operators vote for Stanicut 107 BC

At the start of a bomb fuse contract, an Illinois plant used a paraffin oil and base oil mix on the automatic machines making the fuses. Other oils were tested from time to time. The last one was Stanicut 107 BC—it's the one now used. First, because operators found the work was cooler—and easier to handle—and the oil was light in color. Secondly, management found it gave better finish and tool life and eliminated a mixing job—another four-way improvement from one Standard Cutting Oil Man's suggestion.

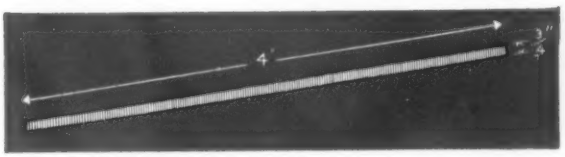
Cures "liver" trouble on forging operation

The lubricant used on forging dies in an Indiana plant was apparently satisfactory except for a "liver-like" sludge which formed when the lubricant separated. In an attempt to cure this trouble, Stanolind Forge Die Lubricant was tried. Much to the surprise of the plant men they found that not only the sludge trouble was ended but the new lubricant clung to the die better, and lubricant consumption was *cut in half*. Mention any problem, large or small, involving cutting oil or stamping compounds to a Standard Cutting Oil Specialist. You may turn his suggestions into a real saving.

Gasoline Powers the Attack . . . Don't Waste a Drop!

HD Soluble Oils—Stanicool—stops tool burning

An Illinois plant wanted to use soluble oils in a turret lathe operation on 4150 stock with high speed tools. But even with a heavy mix of 3 to 1 with conventional soluble oils, tools overheated and rejects were frequent because of poor finish and incorrect size. With no change in speed or feeds, Stanicool HD—a heavy-duty soluble oil—was tried. Even with a 5 to 1 mix, tools ran cool and rejects were almost unknown. Incidentally, soluble oil consumption was cut 50%.



Long threading job speeded up with Stanicut 309 BCS

The job of threading four feet of ¾ inch round, hot-rolled, 4130 bar stock was trying the patience of tool men in a Detroit plant. Chasers got hot and loaded so soon that it was almost impossible to get a satisfactory full length thread. Seven pieces for each grinding of the chaser was average production. Without any other change, Stanicut 309 BCS—a highly sulphurized, chlorinated cutting oil developed for heavy cutting jobs—was put on the operation. Overheating and loading of the chasers were completely eliminated. Production jumped to 24 pieces per grind.

See a Standard Cutting Oil Specialist. One of these Engineers can help you find the answer to your difficult metal working problems. Call the nearest Standard Oil Company (Indiana) office, or write 910 South Michigan Avenue, Chicago 80, Illinois, for his help. In Nebraska, write Standard Oil Company of Nebraska, at Omaha 2.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ LUBRICATION ENGINEERING

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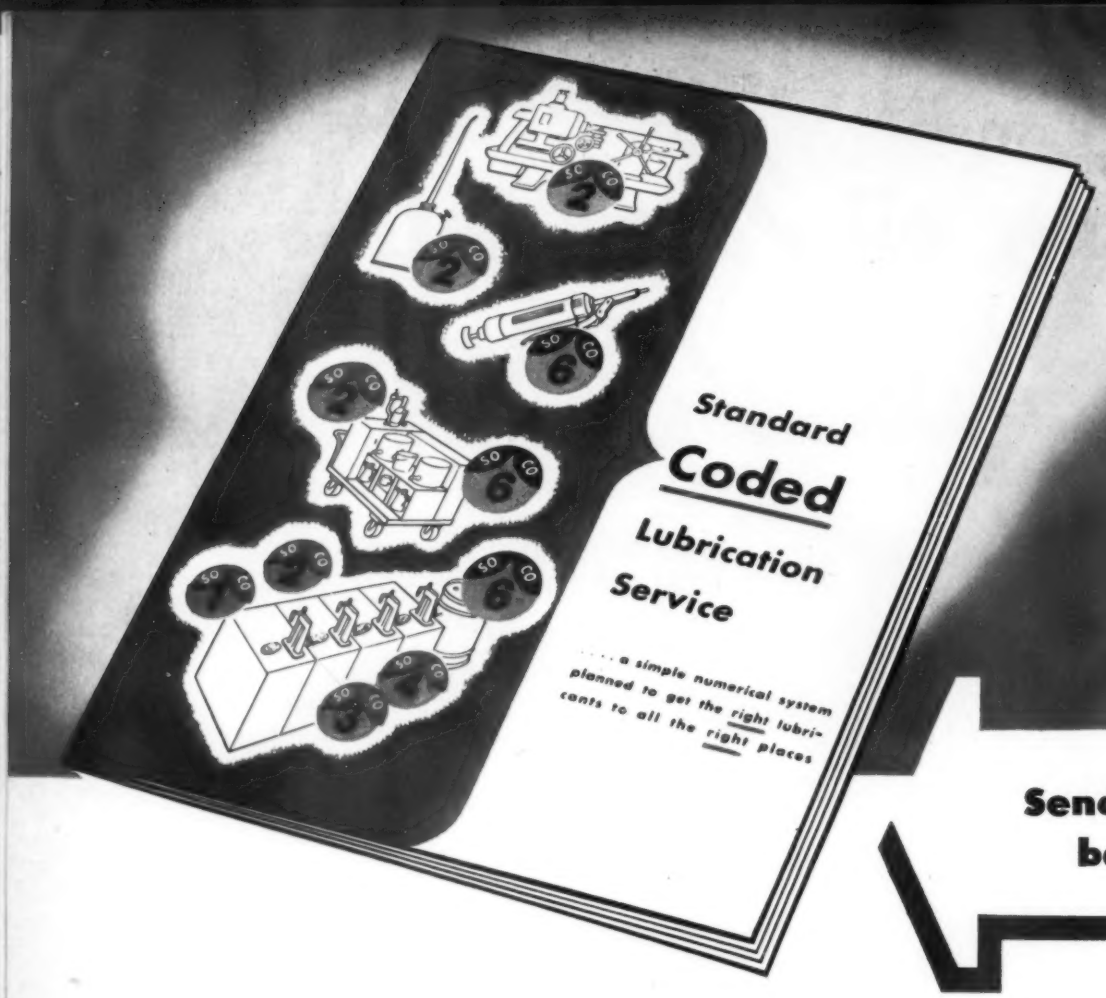

Standard
Coded
Lubrication
Service
. . . a simple numerical system planned to get the right lubricants to all the right places

Send for this booklet . . .

The first, simple system for getting the right lubricant in all the right places

● IT'S AS EASY as 1, 2, 3, to install and follow Standard Coded Lubrication. With it, all lubricants are applied by number. There are no brand names or grade designations for oilers to remember. Here's how easy it is:

The first step is to assign simple numbers (from 1 to 15, or more if necessary) to every lubricant used in your plant. Decalcomanias (paint transfers) are used which are numbered to correspond to the lubricant numbers you have assigned. The decals are applied to:

1. Each spot to be lubricated to indicate what lubricant is needed.
2. Each grease gun, oil can, or other dispenser to indicate the lubricant it contains.
3. Each storage container from which dispensers are filled.

With this system, the newest recruit in your oiler crew can be trusted to get the right lubricant in his grease gun or oil can and apply the right lubricant, where it is needed, by matching the numbers. In addition, machine record cards are available for indicating how often to lubricate, etc., but the simple system of numbering is all that is needed to eliminate most of the lubricant application problems in your plant.

. . . it fully describes Standard Coded Lubrication Service—its advantages, how it is installed, and how you can get it. Better still, if your plant is located in the 14 states shown on the map below, a Standard Industrial Service Representative will be glad to call on you with samples of the decals and forms. He will discuss installing this system in your plant, or applying it to your present lubrication plan, with men in charge of your lubrication. Phone the

nearest Standard Oil Company (Indiana) office for the Representative, or write 910 South Michigan Avenue, Chicago 80, Illinois, for a copy of the booklet. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

Gasoline Powers the Attack . . .
Don't Waste a Drop!

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ LUBRICATION ENGINEERING

Renew the Biting Edge

STATE Four-Cutter Drilling, Boring, Reaming Tools

You can see at a glance that the STATE Four-Cutter principle is a money-saver. Just as the growth of a squirrel's teeth supplies reserve material to renew the biting edge, so the reserve material in STATE Four-Cutter bits can be ground repeatedly to renew the cutting points.

This greatly reduces tool cost; also affords incomparable convenience. That's why STATE Four-Cutter tools have been adopted by leading manufacturers for drilling, boring, and reaming operations.

Standard and Special Models

The standard models of STATE Four-Cutter tools cover a range of hole diameters from ¾" to 6". Special models are built in large variety to meet individual requirements—incorporating duplex heads for boring two or more diameters, wear strips, pilots, collars, facing bits, center oil holes, etc.

STATE Four-Cutter tools are so versatile that they are adaptable to your needs, no matter how tough or complicated. And bear in mind that Four-Cutters have everything it takes for heavy production work.

Ask for Literature and Consultation

Write, wire, or phone us for detailed information. We'll send you fully descriptive literature. If you wish to consult with a factory representative, one is near you to give prompt and competent service. We suggest that you get in touch with us immediately.

STATE MANUFACTURING & CONSTRUCTION CO.

FRANKLIN, OHIO

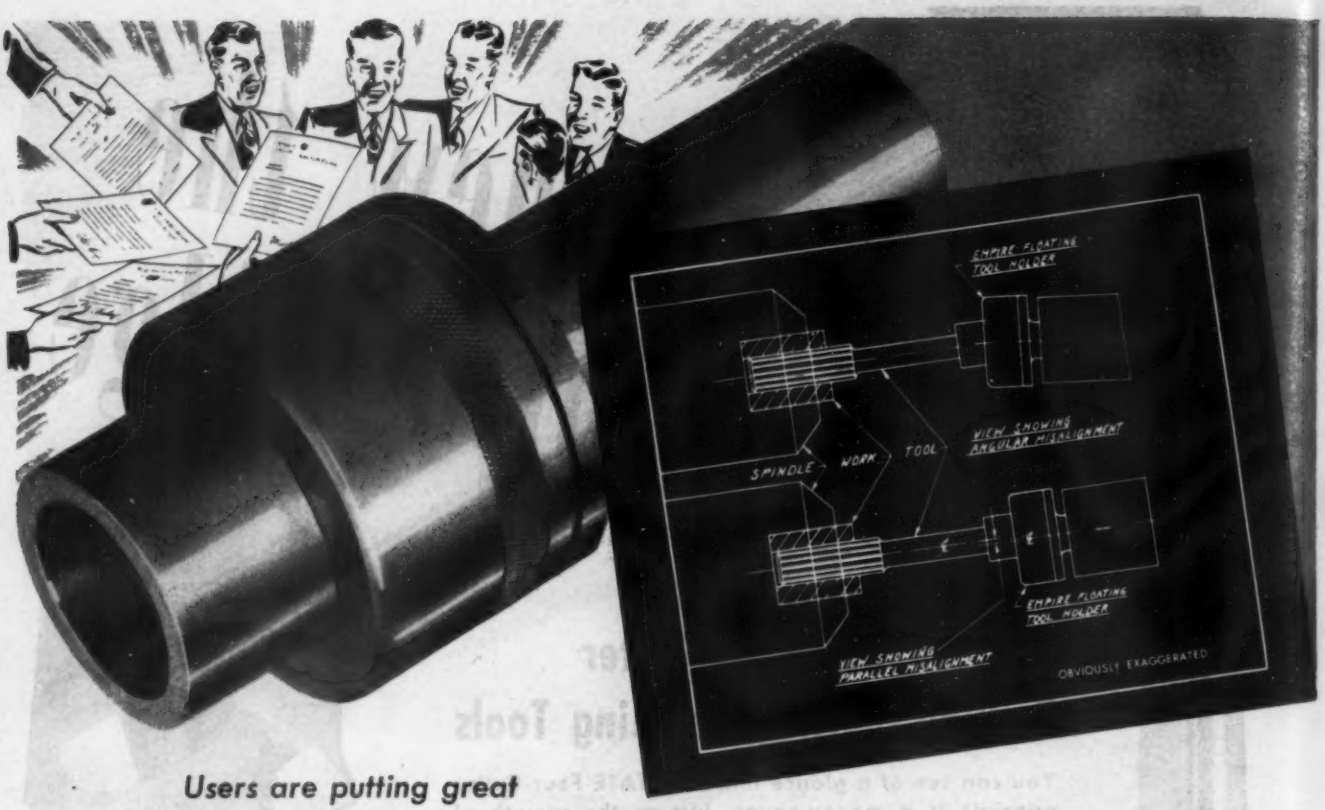
Bits Protrude for Sharpening

The four bits are inserted at an angle. Each can be protruded for sharpening or for increasing the cutting diameter. High speed steel, carbide tipped, and cast alloy tipped bits are available. When original cluster is worn out, a replacement set costs far less than a new tool. Four-Cutter tool bodies last indefinitely, being heat-treated for toughness.

VELSEY Surface Plate

The most accurate flat of its size produced commercially today. Material is diamond black granite which permits lapping to .00005" surface flatness. Freeze-proof, warp-proof, rustless, shock-proof, non-abrasive, non-magnetic, enduringly flat. Made in 12" x 18", 18" x 24", 24" x 36", and special sizes. Literature upon request.

STATE Manufacturing & Construction Co.



Users are putting great emphasis on the statement that the Empire Floating Tool Holder is

The First Floating Tool Holder that Compensates for BOTH Parallel and Angular Misalignment

In letters and by word of mouth users are expressing their genuine pleasure with the performance of this new Empire Floating Tool Holder. They say it is the only one that really floats, and corrects angular and out-of-parallel misalignment. No bell mouths can occur. Holes can be reamed to close tolerances—starting with the very first one you ream. Having only five parts — easily disassembled — the holder has a reduced wear factor. By referring to diagram you will note that the cap and shank float independently of each other, achieving a free and easy movement — a unique engineering design not present in any other floating tool.

Available with holes and sleeves in following sizes: ⅜", ½", ⅝", ¾", 1", 1¼", 1½" with shank diameters: ⅝", ¾", 1", 1¼", 1½", 1¾", 2", 2¼". These Holders are available for any machines from the smallest Brown & Sharpe Automatics to the largest hand or automatic screw machines.

TRY AN EMPIRE FLOATING TOOL HOLDER FOR 30 DAYS
If you're not thoroughly satisfied, return it for full credit

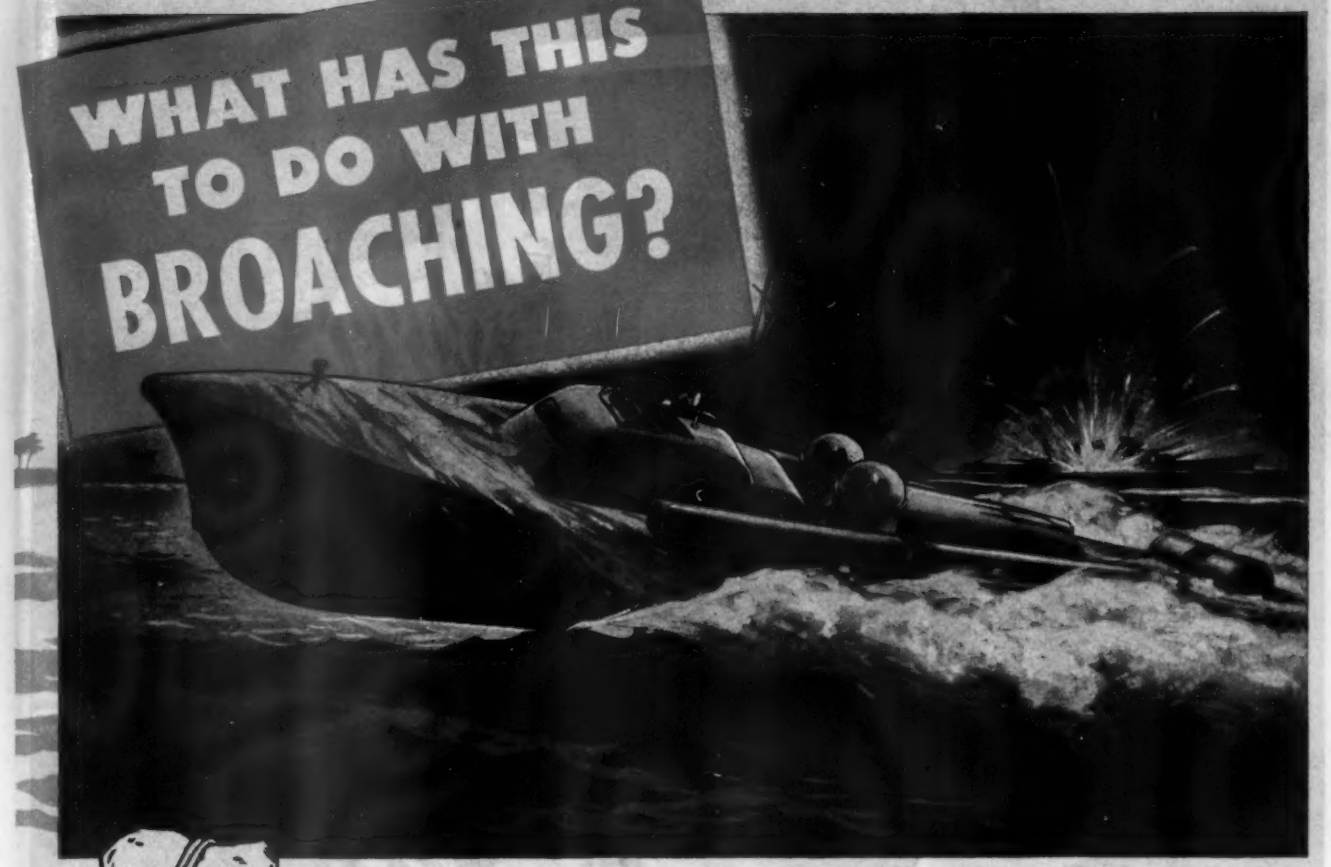
SEND FOR CATALOG **BUY WAR BONDS**

Also, manufacturers of Empire Tool Company's Luers Patented Cutting-off Blades and Holders, and distributors of Fastcut Centerdrills and Keyseat Cutters.

EMPIRE Tool Co.

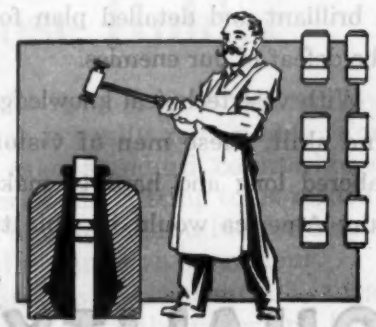
8778 Grinnell Ave.
Detroit 13, Mich.

WHAT HAS THIS TO DO WITH BROACHING?



SOMEWHERE in the dark of a Celebes moon, a silent shape steals closer, ever closer to the menacing bulk of a Japanese heavy cruiser. Suddenly . . . its mighty engines exploding in a thunderous roar . . . it drives home its lethal load and swerves, madly bucking, to make good its escape. Aiding in its headlong dash for safety, beyond the reach of vengeful guns, is the careful design and construction of its bow sections . . . a modern scientific development of the ancient, fundamental principle of the Wedge, which has served Man in countless usages from the first flint axe to the P. T. boat.

ALSO serving mankind in the scientific adaptions of of fundamental engineering principles, Lapointe has been ever first to combine imagineering with time-proven principles. Broaching is no longer just another method of removing metal. In the hands of those who plan for Tomorrow, broaching has become a powerful weapon in the war of production . . . and in those same hands, will provide revolutionary achievements in the days of peace, by making things quicker — cheaper . . . and better!



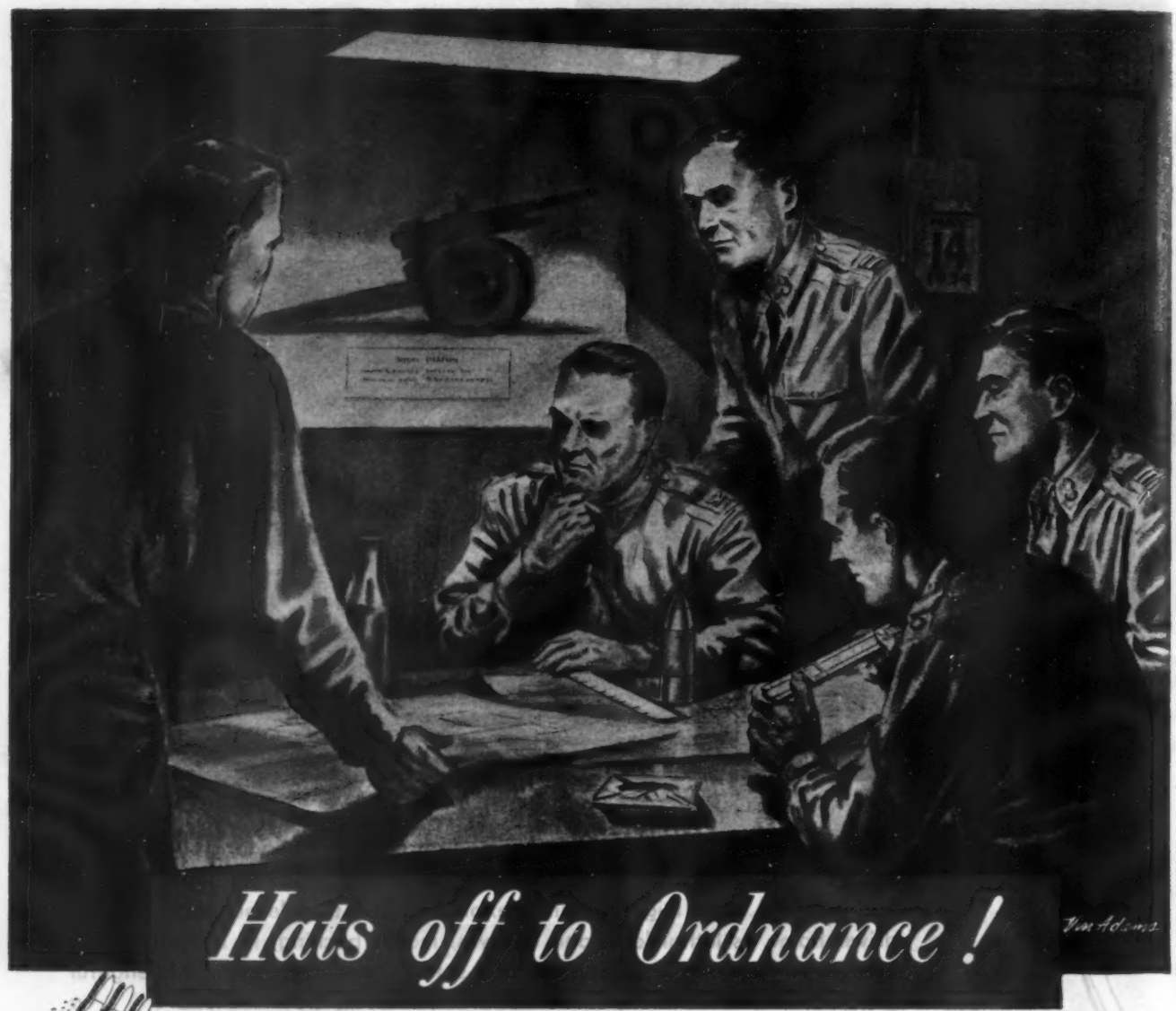
The first broaches, or drifts, as they were then called, were driven, one upon another, through the work part.

ARMY E NAVY

The LAPOINTE Machine Tool Company

HUDSON, MASSACHUSETTS, U. S. A.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES



MANY years before the first bomb fell on Pearl Harbor, Ordnance officers had worked out a brilliant and detailed plan for the defeat of our enemies.

With vast technical knowledge and skill, these men of vision labored long and hard to make sure America would be able to rise to any military emergency.

The miraculous swiftness with which American plants shifted from peace-work to War Work was largely due to these officers who charted every step, blueprinted every item . . . anticipated difficulties and solved problems in advance.

In our opinion, this will be recorded as the greatest engineering job of all time. For this and other outstanding service to their Country, we say: "Hats Off to Ordnance."

Keep on Buying War Bonds

QUALITY TOOL & DIE CO.

Manufacturers of "Quality" Products

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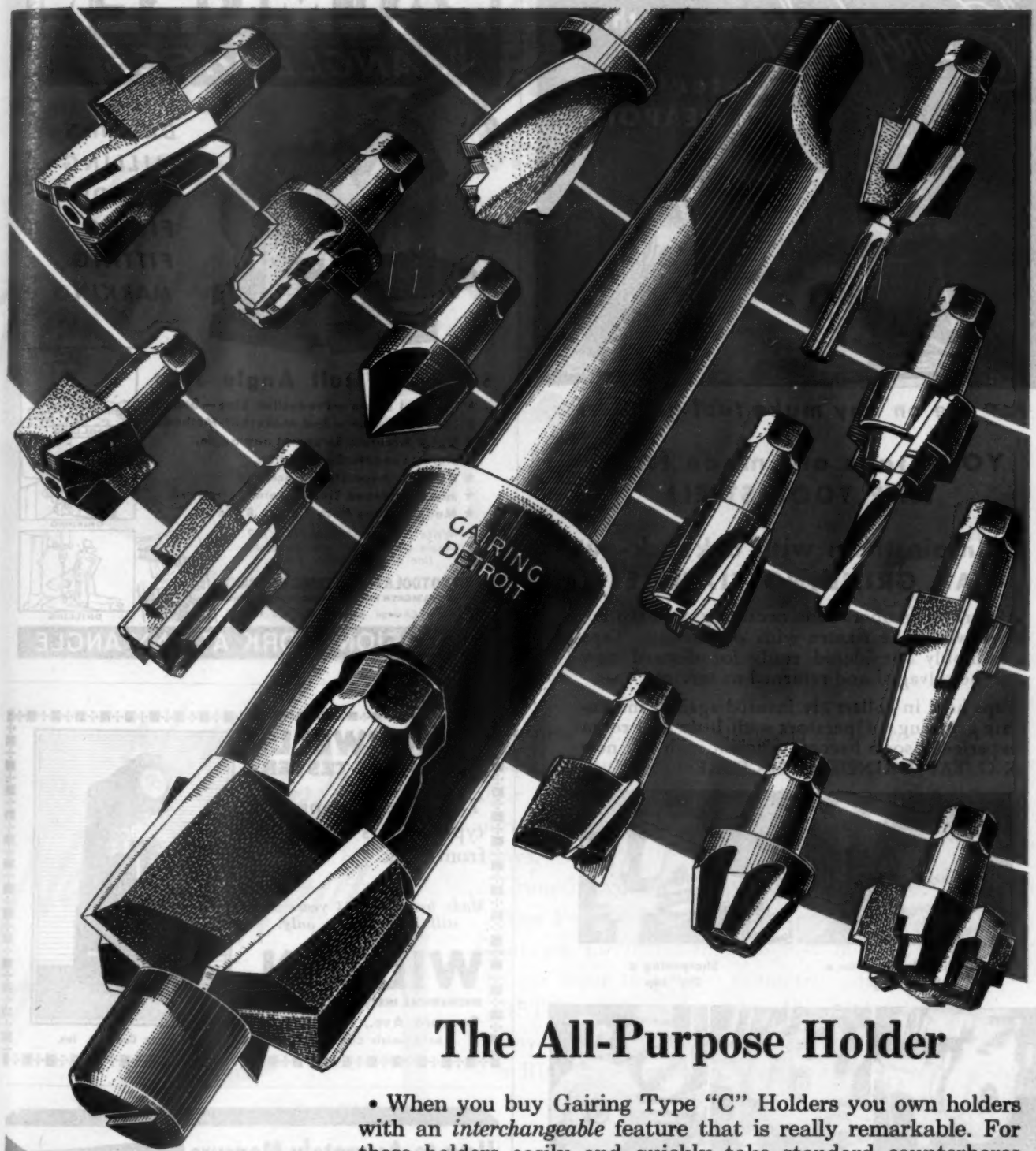


The All-Purpose Holder

• When you buy Gairing Type "C" Holders you own holders with an *interchangeable* feature that is really remarkable. For these holders easily and quickly take standard counterbores and countersinks as well as *all types* of end cutting tools regardless of shape, contour or angles. They are adaptable for single or special purpose, or for a series of progressive operations.

• The taper and hexagon socket in this holder centralizes the cutter and serves as a driver co-acting with the taper and hexagon shank of the cutter. Thus, rigidity and perfect alignment are assured.

• The *adaptability* of these holders is amazing—their intelligent use is production economy, particularly in these days of reconversion. *Write today for sizes and prices.*

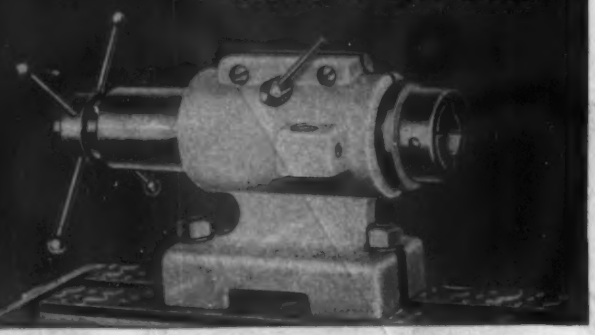
Our Engineering Department will gladly assist you with any tooling problem you may have. No obligation.

The Gairing Tool Company, Detroit 32, Michigan.

GAIRING

Designers and manufacturers of standard, special and Gair-Lock cutting tools for more than a quarter century

"Everybody" knows that tool steel is a WAR WEAPON!



For use on any make tool grinder!

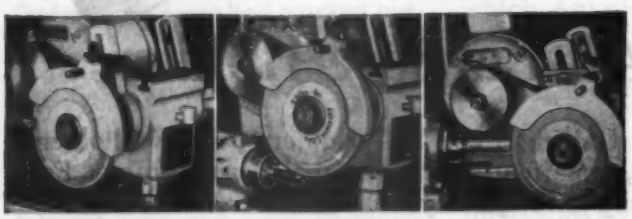
YOUR taps are made from FINE TOOL STEEL!

Maintain them with a knock-out TAP GRINDING FIXTURE!

All grinding operations necessary on a tap are done with one fixture with one set-up. Taps commonly considered ready for discard now can be salvaged and returned to service.

Taps held in collets are insured against inaccurate grinding. Operators with little tool room experience soon become efficient with the new K-O TAP GRINDING FIXTURE.

Grinding the relief on a No. 10 tap — Sharpening a 2½" tap



Sharpening a Standard tap — Grinding the flutes — Salvaging broken tap

K.O. LEE CO.
ABERDEEN, SO. DAK.

PALMGREN ANGLE VISES

DRILLING
MILLING
GRINDING
FILING
FITTING
MARKING

Solve Difficult Angle Jobs

- ★ For Tool Room—Production Line—Bench.
- ★ Speed up work—End Makeshift Methods.
- ★ Quick Accurate Setups at any angle.
- ★ Sturdy Longlife Construction.
- ★ All Parts Accurately Machined.
- ★ Jaws Hardened Steel—Plain or Grooved.
- ★ Made in Sizes from 1½" to 8" Jaws.

Write for circular AM-111 "102 Angle Operations" and complete line of PALMGREN Vises.

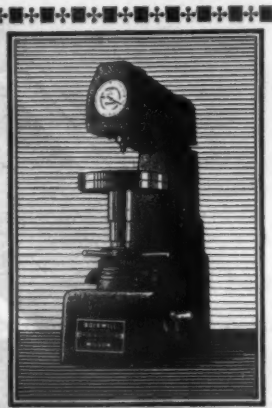
CHICAGO TOOL & ENGINEERING COMPANY
Mfrs. of PALMGREN PRODUCTS for over 25 years
8345 South Chicago Avenue, Chicago 17, Ill.

PRECISION WORK AT ANY ANGLE

"ROCKWELL" HARDNESS TESTER

These new improved type testers available from stock.

Made by us for 23 years and still made by us only.



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MECHANICAL INSTRUMENT CO. INC.
Concord Ave., New York 54
An Associate Company of American Chain & Cable Company, Inc.

How to Accurately Measure Large* Unwieldy Parts...
* Up to 168"

...is explained in this **FREE BOOKLET**

Write for your copy today. Learn how D&T Tubular Micrometers and Standards can be applied as accurately to the measuring of work up to 168" as ordinary micrometers are to small precision parts.

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Davis and Thompson Co.
Mfrs. of Machine Tools and Micrometers
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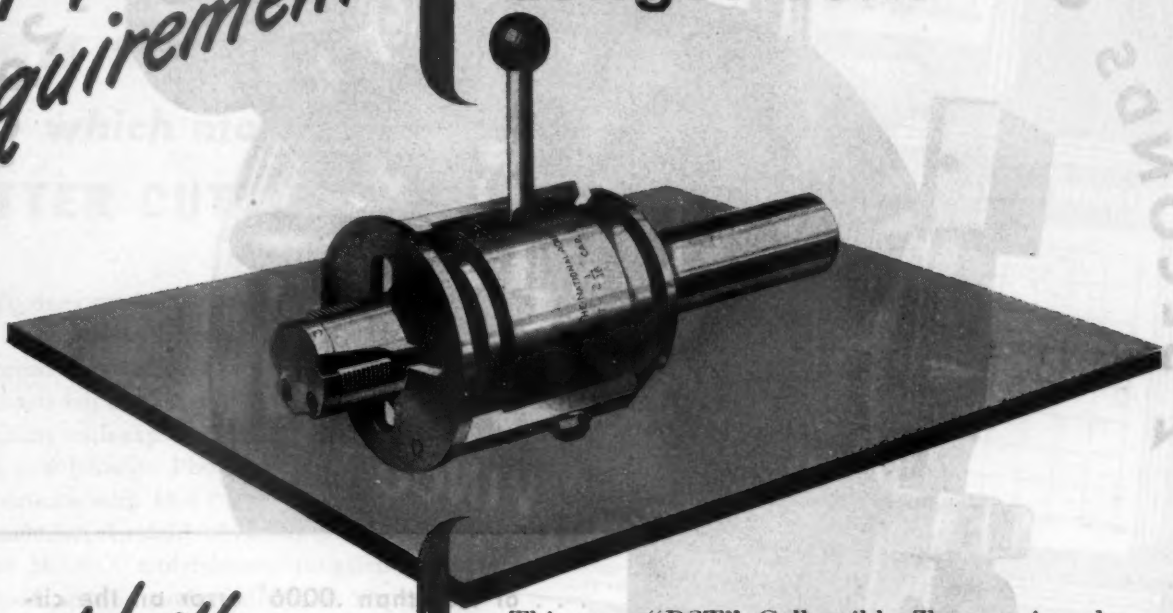
New Tapping Requirements

Tougher alloys
Finer Limits
Smoother finish
Longer runs



New Namco Tap meets them ALL

This new "RST" Collapsible Tap retains the design advantages of back supporting chasers their full length on heavy core piece, side supporting by heavy body—stamina for tough alloys.

Ground thread chasers—for fit and finish.

New Feature is *positive* and *instant* control at point set for collapsing, no lost motion, and chasers reset to precise diametric adjustment.

RST is a universal, double-duty tool—simply remove handle for revolving spindle machines—a BIG saving in tool investment.

Send for your copy of New Tap and Die Catalog D-42-B. Complete information on automatic taps and dies made especially to serve the higher standards of precision at lower threading costs.

THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS
THE CHRONOLOG • LIMIT MOTOR STARTER AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

2 SECONDS OF ARC—TWO PARTS IN 1,296,000...

. . . or less than .0006" error on the circumference of a ten foot circle. . . . The nearest approach to perfection ever devised for checking the spacing and angular location of gear teeth, master index plate notches, splines or any other form of circular division. . . . A positive method for locating those minute errors whose accumulated total means costly adjustment and low production. . . . A rugged, sturdy inspection instrument that is an essential wherever precision production is maintained. **THE VINCO MASTER INSPECTION OPTICAL DIVIDING HEAD.**

Complete details furnished on request.

VINCO CORPORATION, 8851 Schaefer, Detroit 27, Mich.
SALES OFFICES: NEW YORK, CHICAGO, CLEVELAND

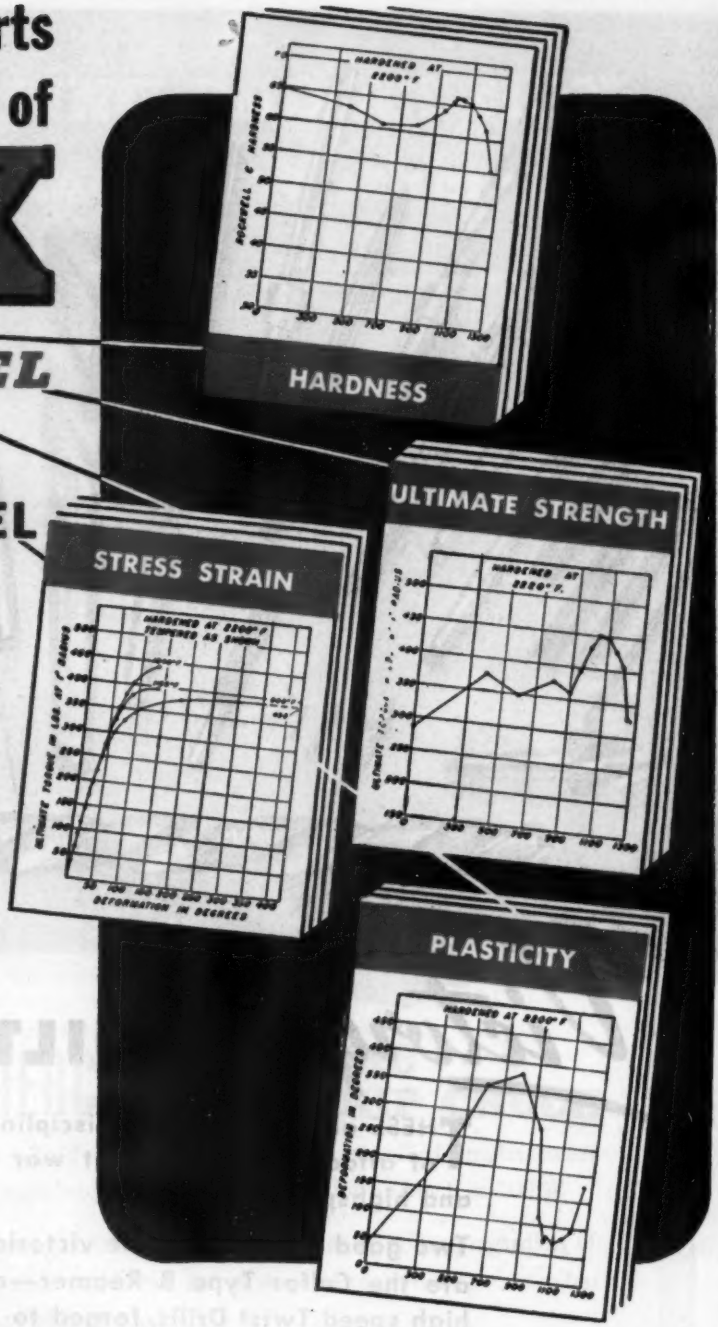
MILLIONTHS OF AN INCH FOR SALE BY VINCO

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power, Control, Utilization and Distribution Units • Engineering, Design and Development.

These four series of charts show the basic properties of MO-MAX

HIGH SPEED STEEL

which make it a BETTER CUTTING STEEL



To demonstrate the working characteristics of MO-MAX high speed steel under a broad range of heat treatments a series of charts has been carefully prepared. These charts with explanatory text are shown in a new booklet. Photomicrographic comparisons with 18-4-1 high speed steel are included. A wealth of factual information on MO-MAX molybdenum-tungsten high speed steel is condensed into its 52 pages. It tells HOW — to select the steel for the job — to forge — to anneal — to weld and braze — to harden — to temper. This makes it a most valuable and authoritative contribution to the study of high speed steel.

MO-MAX HIGH SPEED STEEL — YEAR AFTER YEAR — One Uniform Standard

THEY'RE ALL MO-MAX

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"Mohican"	Atlas Steels, Ltd.	"Rex-T-Mo"	Crucible Steel Co. of America	"S. T. M."	Simonds Saw and Steel Co.
"Bethlehem HM"	Bethlehem Steel Company	"Di-Mol"	Henry Disston & Sons, Inc.	"Mo-Tung"	Universal-Cyclops Steel Corp.
"Mo-Cut"	Braeburn Alloy Steel Corp.	"Rex-T-Mo"	Halcomb Steel Co.	"8-N-2"	Vanadium-Alloys Steel Co.
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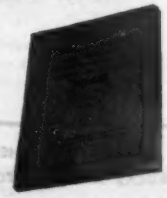

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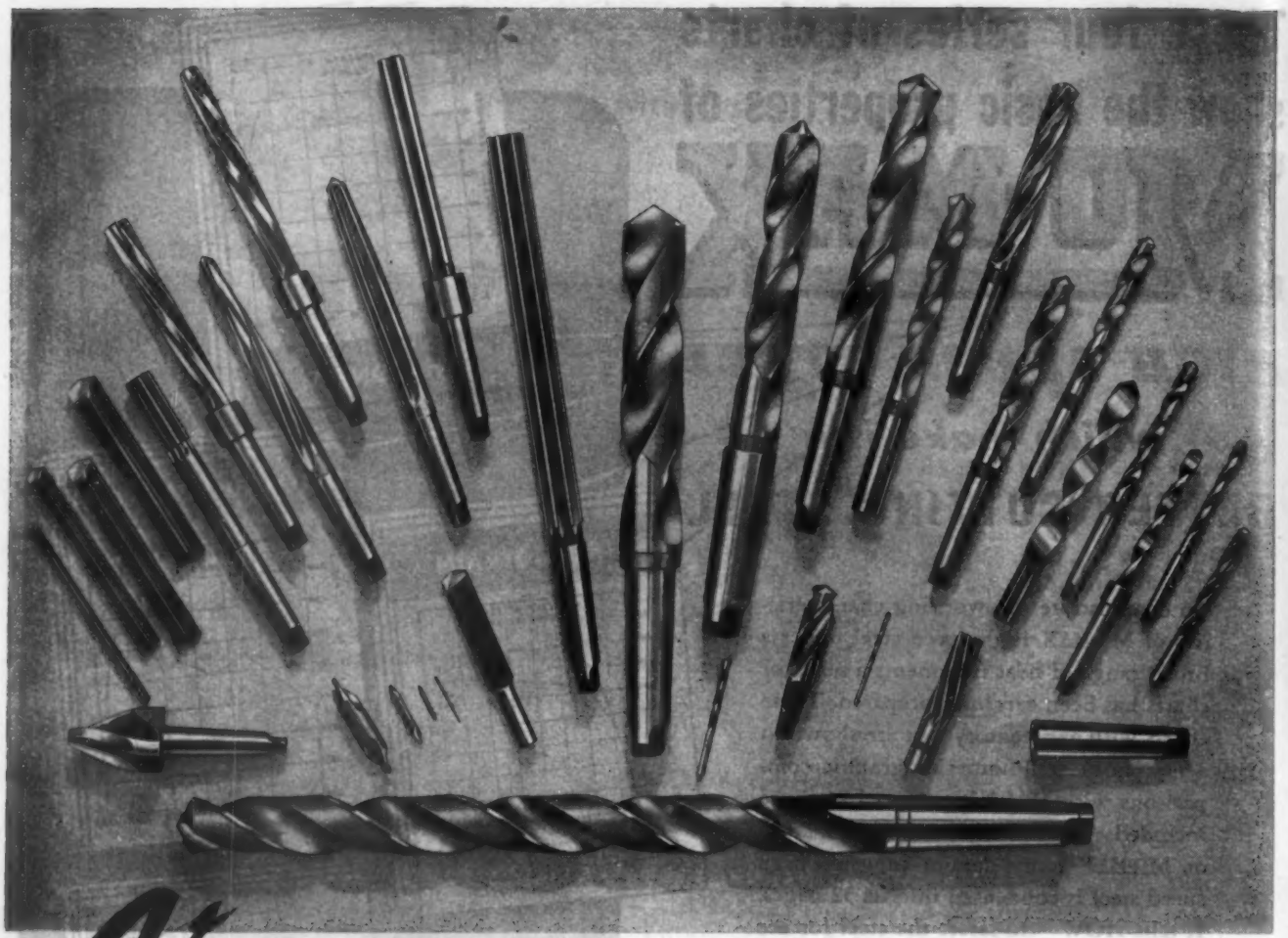

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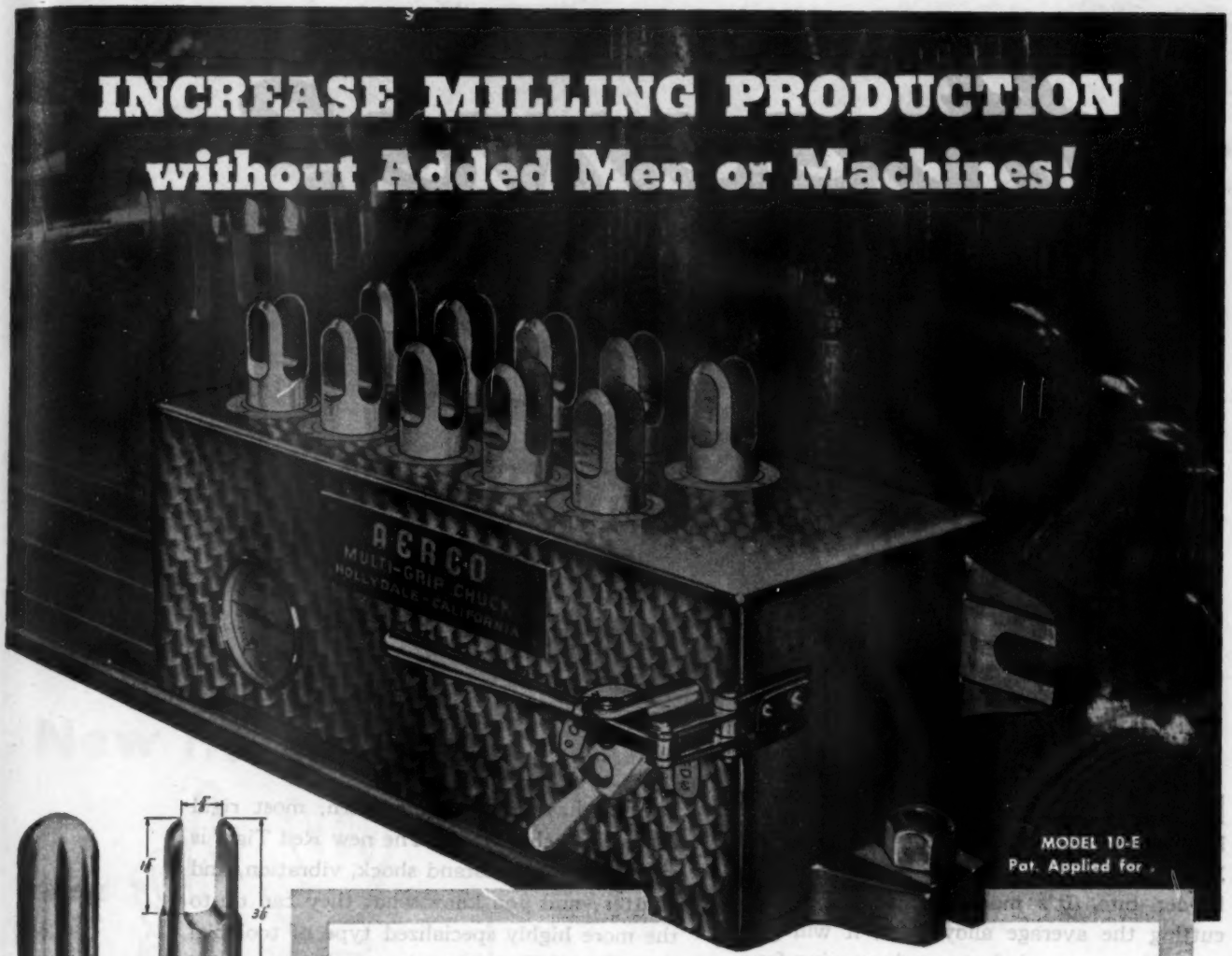

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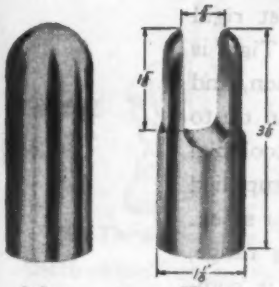
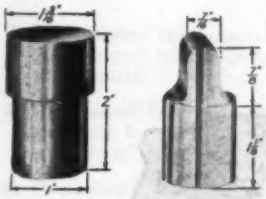


Before After

Aluminum Parts

These aluminum parts were milled upon the Aerco Multi-Grip Chuck at the rate of 355 per hour (floor to floor) as compared with single milling operations of only 71 per hour.



Before After

Chrome Steel Parts

These parts, high heat treated of Chrome-moly, were produced at the rate of 62 per hour (floor to floor) on the Aerco Multi-Grip Chuck. Individual milling time was 15 per hour.

These parts milled with the use of the Aerco Multi-Grip Chuck show its versatility.

with the AERCO HYDRAULIC MULTI-GRIP CHUCK

Two rows of collets hold ten parts and both rows are milled simultaneously and with but a single loading increasing production as much as 500%.

Self-centering aligning collets insure perfect on-center milling regardless of slight shank diameter variations. Safety stop prevents damage to collets should all stations not be loaded.

Aerco Multi-Grip chucks may be used for both vertical and horizontal milling. Work is held rigidly in collets and cannot turn or be pulled out during milling operation, however clamping pressure is instantly releasable and self-opening collets can be quickly re-loaded.

Collet sizes range from ⅛" to 1¼" and are available in round, square or hexagon shapes.

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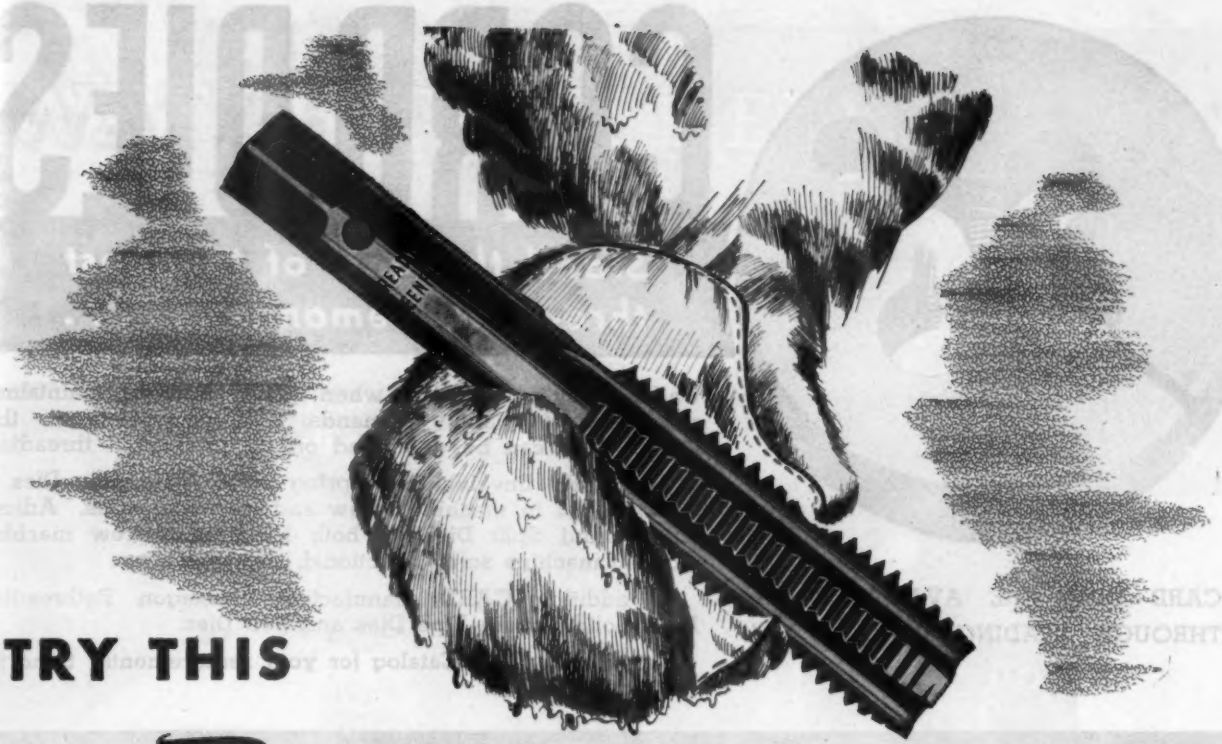
Analysis of Improved Red Tiger

C	Cr	W	V	Mo
1.00	4.50	18.50	3.00	2.00 max.

Red Tiger
(Improved) HIGH-SPEED TOOL STEEL

BETHLEHEM STEEL



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Remember, that in Threadwell *Cold-Temper* Taps you get all five of the familiar and distinctive Threadwell advantages *in addition* to the superior performance resulting from *cold-tempering:*

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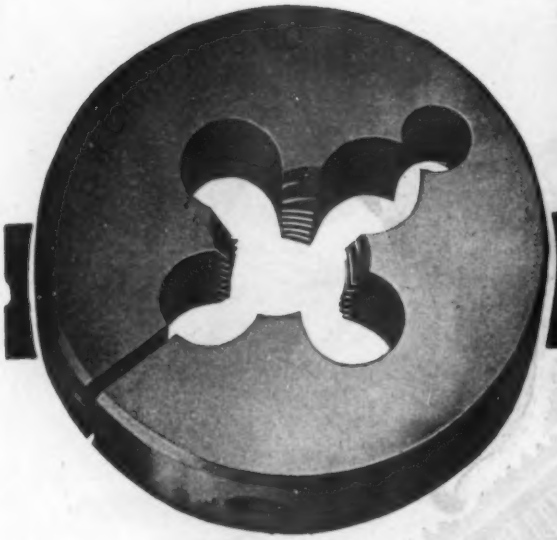

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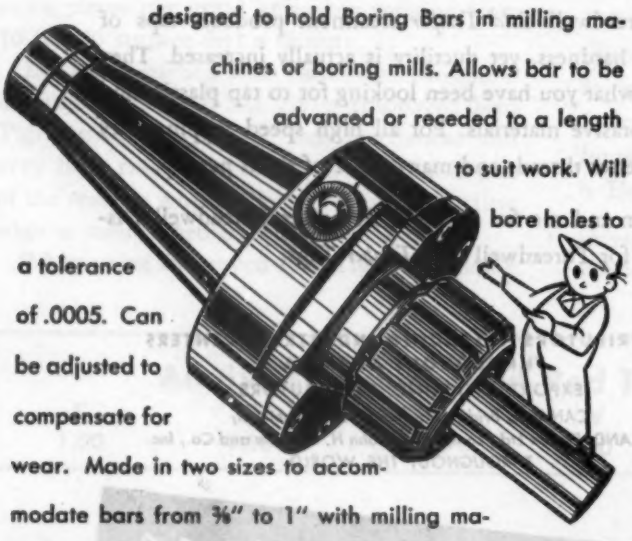

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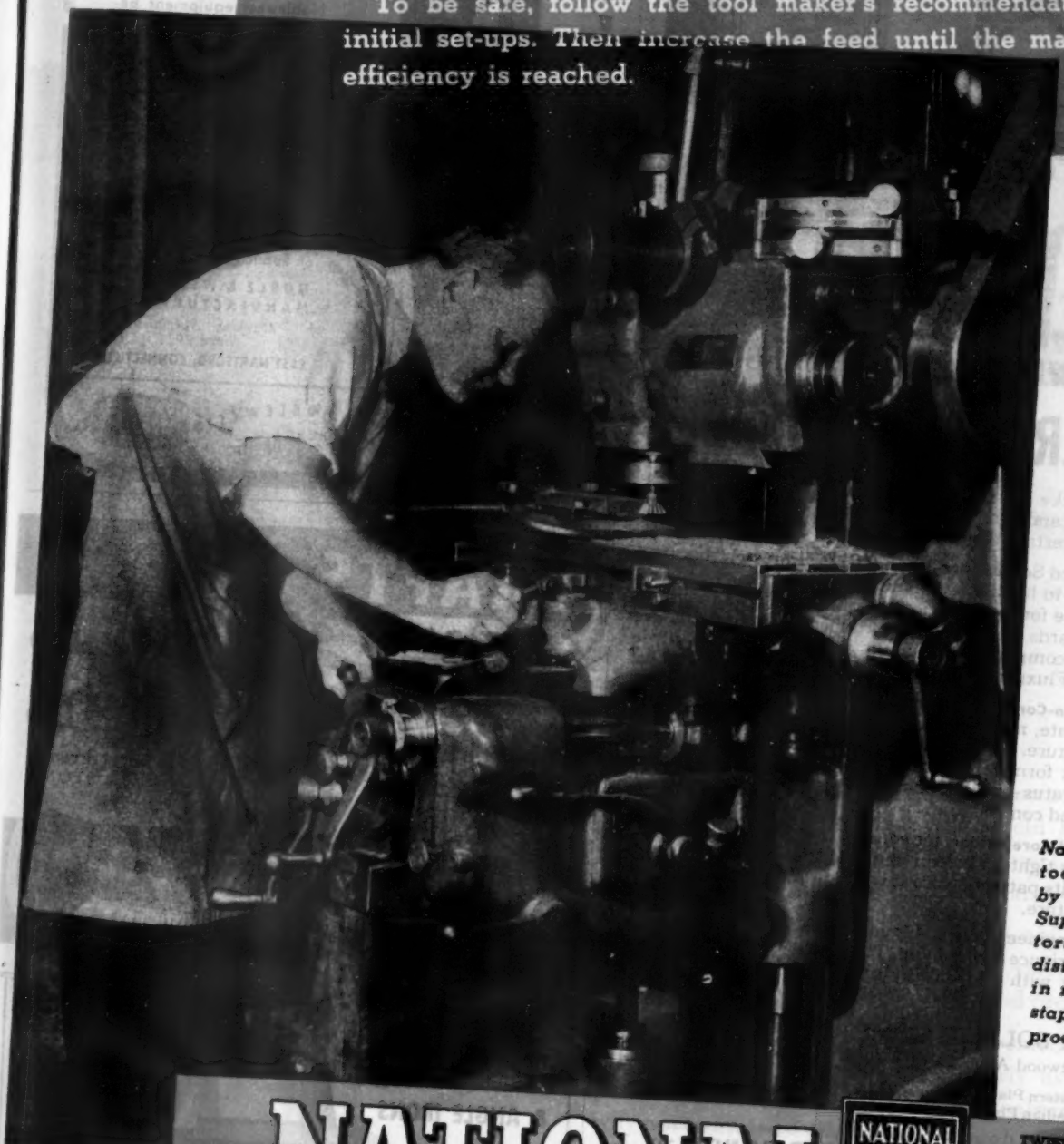

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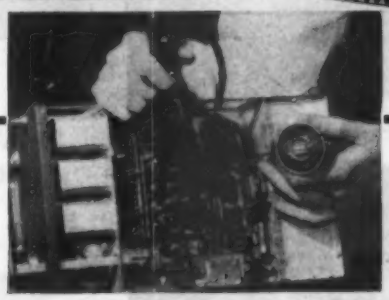

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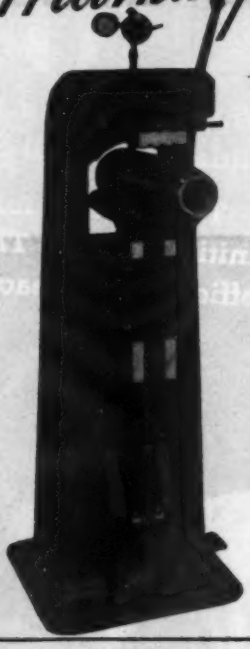

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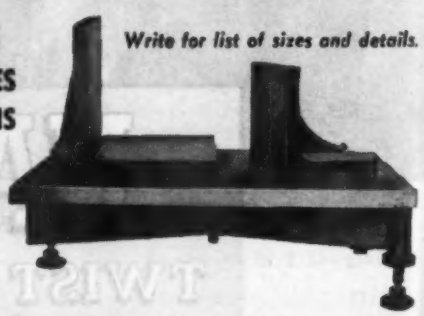

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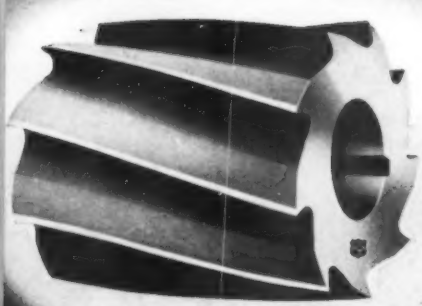

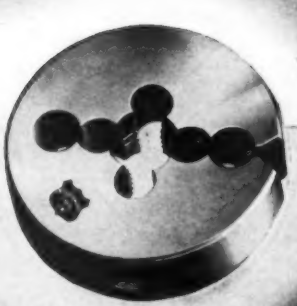

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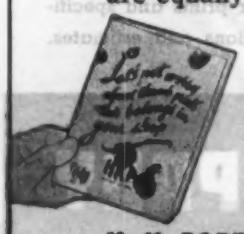

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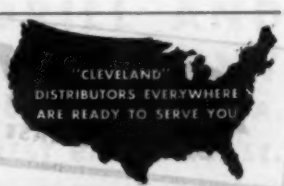

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SUPERIOR MICROMETERS for "PRECISION" MEASUREMENT . . . A Tumico TRADITION

Today Tumico Micrometers enjoy the world wide acceptance of discriminating workmen.

PROMPT DELIVERY!

TRADE TUMICO MARK

The excellence in design and the sturdy construction you find in our Tubular Micrometers is the result of over thirty years of service to the industry.

The Tubular Micrometer Company
St. James, Minnesota, U. S. A.

FASTER HAND OR PRESS STAMPING

12 characters, more or less, stamped at one blow. Press the thumb clip and quickly change type or dies for next markings. No weakening groove in type. Heavy Duty Type with "Extra Strength Shoulder" stamps any untempered steel, or other material. Ask for HERCULES HOLDER & TYPE.

Write for literature and price lists.

THE ACROMARK CO.
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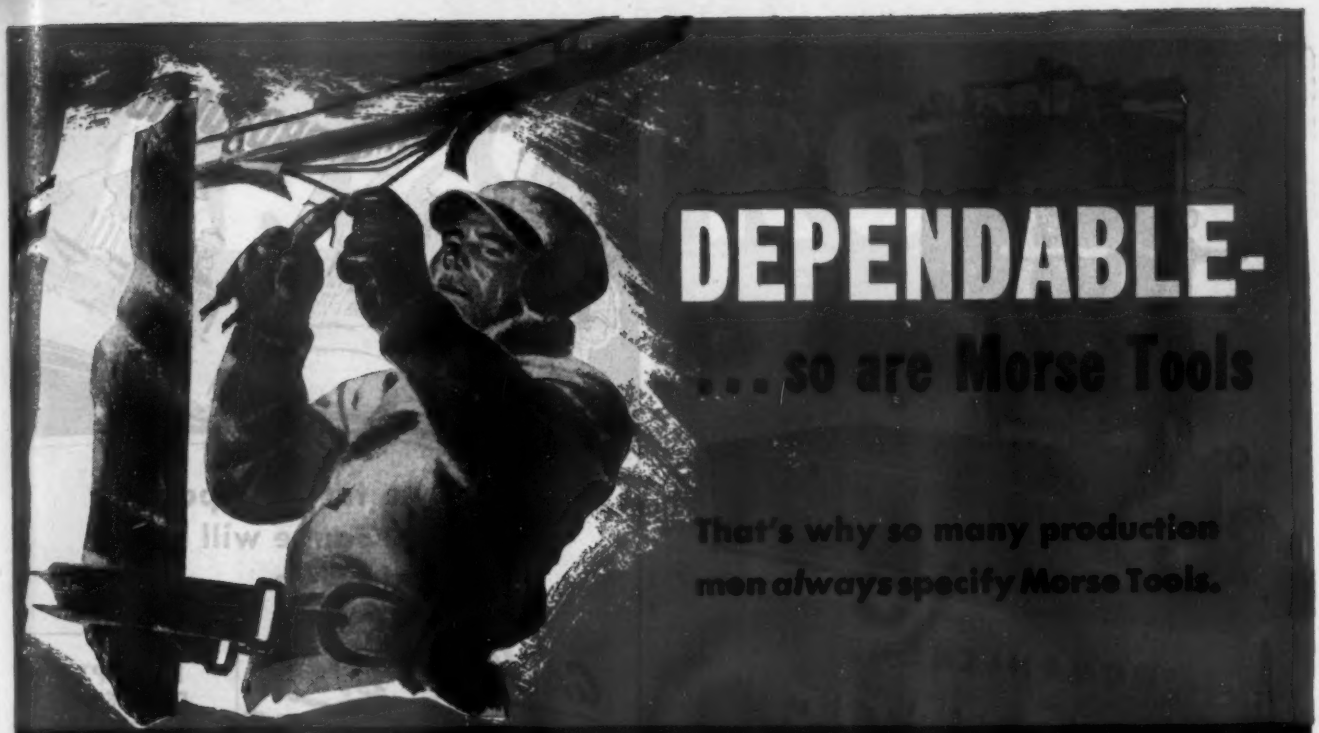
PRECISION MACHINE VISES

All Perkins Swivel Vises swing 360 degrees and have complete circle graduations. All Angle Vises raise 92 degrees.

Write for Bulletin No. 110

MILLER-KNUTH MFG. CO. OMAHA, NEB.



DEPENDABLE-

. . . so are Morse Tools

That's why so many production men *always* specify Morse Tools.

TOOLS ARE WEAPONS . . . TREAT 'EM RIGHT!

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THERE IS A DIFFERENCE

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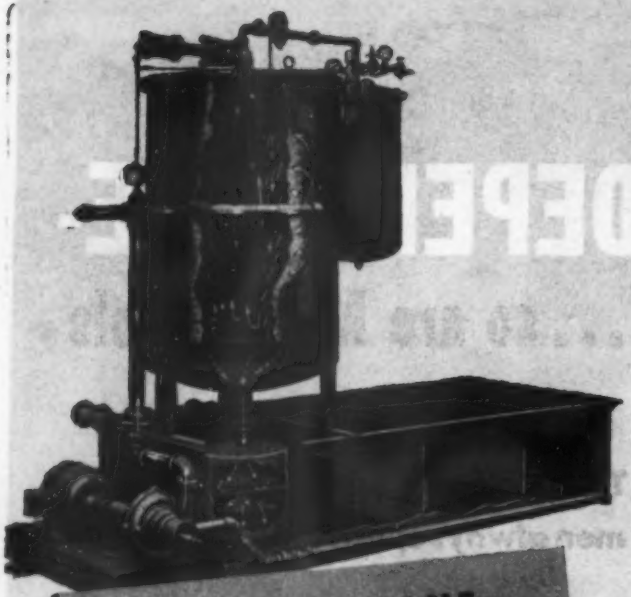


HONAN-CRANE
AUTOMATIC CLARIFIER

AUTOMATIC MACHINE for the removal of chips and abrasives from oils and coolants used in grinding, honing, cutting, boring and similar operations.

Outstanding operating features guarantee maximum efficiency.

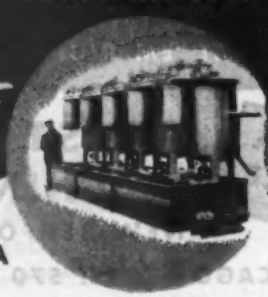
- Cycle of operation is automatic, blow down action of air pressure cleans screens at desired intervals.
- Oil used for cleaning filter screen is separated from mud and returned to Clarifier for refiltering. Practically no oil lost.
- Solenoid controls and adjustable electric timing allow this Clarifier to be keyed to the exact conditions that are required in any given operation.
- Every feature of construction has been carefully engineered to give you years of trouble-free service.

Honan-Crane Automatic Clarifiers are in use in some of the largest metal working plants in the country such as Ford Motor Car Co., Kelsey Hayes Corp. and many others.

Write for complete specifications on equipment and Engineering Bulletins on purification of Cutting Oils and Coolants.

HONAN-CRANE CORPORATION*

Oil Purification Equipment



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★ SUBSIDIARY OF HOUDAILLE-HERSHEY CORPORATION

When we turn the page, Master Gauge will be ready with . . .

GAUGES DIES JIGS FIXTURES

PROMPT DELIVERY ON THREAD PLUG GAUGES

MASTER GAUGE CO.

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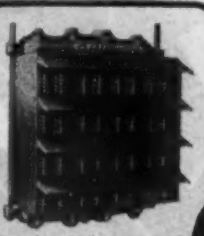


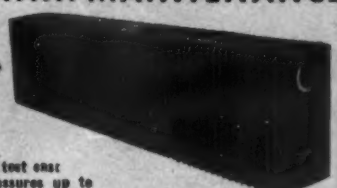
IF YOU WANT PERMANENT HEATING EQUIPMENT . . .

GRID *is the* UNIT HEATER

Install

TODAY FOR TOMORROW'S NEEDS— AND DO AWAY WITH MAINTENANCE

HERE'S WHY . . .



One piece construction heating sections (patented) of high test cast iron that withstand steam pressures up to 250 lbs. . . . no soldered, brazed, welded or expanded connections to become loose or develop leaks . . . no electrolysis to cause corrosion, breakdowns, leaks, or heating failures.

HIGH TEST *Cast Iron* HEATING SECTIONS

In many plants GRID Unit Heaters have been in continuous operation for 10, 12, and more years without maintenance, because GRID Unit Heaters are built to last, so why install unit heaters with less permanency and efficiency? Complete data and capacity tables upon request.

GRID

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ARMSTRONG

New drawings, new operations, but the same ARMSTRONG TOOL HOLDERS

When war came, thousands of plants laid aside their prints and their gauges, re-arranged their schedules, and with the same ARMSTRONG TOOL HOLDERS which they had used for civilian manufacturing, turned to the production of war materials. In the same manner, after victory, it will be with new drawings and these same ARMSTRONG TOOL HOLDERS, that normal peace time production will be resumed on lathes, planes, slotters and shapers.

Permanent, multi-purpose tools, used in over 96% of the machine shops and tool rooms, ARMSTRONG TOOL HOLDERS are essential to American Industry, in peace or war. They are the standard tools for basic machining operations, which with American ingenuity have built and will rebuild America's production greatness.

Whatever your post-war plan or product, you will probably start operation with ARMSTRONG TOOL HOLDERS. Check now to see that you are well supplied with the types and sizes you will need.

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"The Tool Holder People"

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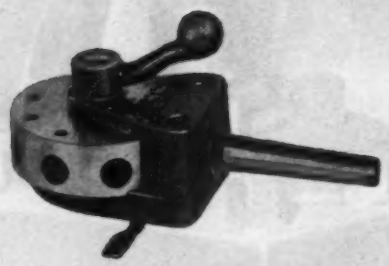
ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

How to do turret lathe machining ... on your engine lathe!

THESE 3 SPECIALTIES LATHE ACCESSORIES MAKE IT POSSIBLE

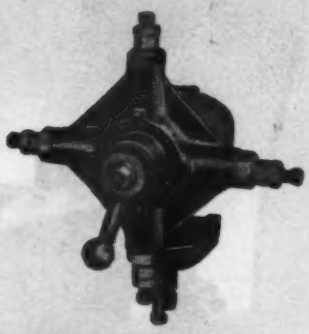
SPECIALTIES CROSS-SLIDE TURRET

Gives you four working positions without tool changes . . . allows multiple machining operations on one lathe. Easy to operate—merely flip the turret from one position to another. No. 30 for 9" to 12" lathes; No. 60 for 13" to 20" lathes.



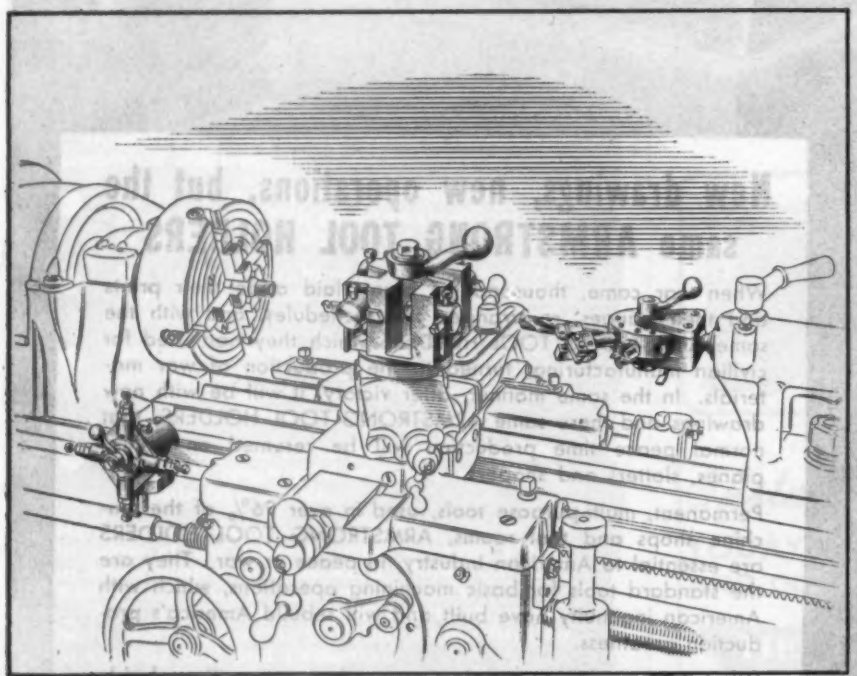
SPECIALTIES TAIL-STOCK TURRET

Quickly converts engine lathe into 4-way turret lathe for end work. You can perform four different operations with the four positions. No. 58 with No. 2 Morse Taper Shank; No. 103 with No. 3 Morse Taper Shank; No. 104 with No. 4 Morse Taper Shank.



SPECIALTIES LATHE STOP

For multiple operations — eliminates repeated measuring. You measure only once for each operation. Once the four positions are set, you just index. No. 10 for 9" to 12" lathes; No. 20 for 13" to 20" lathes.



CONVERT

YOUR ENGINE LATHE INTO A TURRET LATHE

Any lathe can be converted into a complete, accurate, precision turret lathe in *minutes* with these SPECIALTIES lathe accessories. Attached to your engine lathe, the SPECIALTIES Cross-Slide Turret, Tail-Stock Turret and Lathe Stop permit you to do any kind of work—forming, roughing, boring, finishing, tapping—without stopping the lathe or changing tools.

Mail the coupon for complete information about this SPECIALTIES production team designed to help you increase the capacity of your lathe and cut machining costs.

SPECIALTIES Manufacturing Co., Inc.
45 Farrand Street, Bloomfield, N. J.

Please send me full information on SPECIALTIES lathe accessories.

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Company_____

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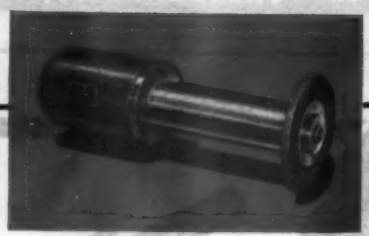
SPECIALTIES
MANUFACTURING COMPANY, Inc.

LOOK INTO THIS . . .

POPE

SEALED MOTORIZED SURFACE GRINDER SPINDLE



Use this new and finer *Sealed Motorized* Spindle on all makes of 6" x 18" surface grinders. Its sealed-in motor may be 220 or 440 volt — 2 or 3 phase — 60 cycles, or 550 volt — 3 phase — 60 cycles.

It operates to equally good advantage horizontally, vertically or at any angle on boring mills, planers, milling machines and other machine tools for special work.

Actually, unless we cut one open for you, the only thing you can see in this completely sealed unit is the results.

You can't see the G-E full 1 HP motor because it's sealed in — no openings for dust, dirt, nuts and bolts, unwary fingers — nothing to prevent its running at maximum efficiency indefinitely.

You can't see those SKF Super-Precision, Double Row roller bearings. They're sealed in, too, and with them the lubricant — no oiling or greasing to worry about or overlook.

And you can't see the massive inner construction and precision craftsmanship that give this Spindle the ability to produce finer finishes and to rough off surplus metal in jig time whenever required.

But you *can* see what it will do on *your* machines and for *your* ground surfaces. That's why we say *look into it*, now, for replacement of your present spindles, if you want to do better grinding and more of it at lower net cost.

POPE

REG. U. S. PAT. OFF.

POPE MACHINERY CORPORATION

ESTABLISHED 1920

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BUILDERS OF PRECISION SPINDLES

CRITERION *Boring Heads*

TOOLS of *Quality* for *Quantity* PRODUCTION

Noted for maintaining original accuracy over a longer period. Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. LEAD SCREW IS HARDENED TOOL STEEL, WITH THREADS GROUND FROM SOLID AFTER HARDENING. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

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MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

Darwin

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COBALTCROM
Air Hardening, Non-Deforming, Cobalt High-Carbon, High Chromium Steel

A steel with an *original, basic* formula . . . Made to our own specifications and for many years accepted as a standard of comparison for steels of this type.

Grinds super keen and is unsurpassed for dies requiring a perfect edge. PRK-33 has a secondary hardness ideal for tools and dies. It is preferable to high speed steels for non-ferrous cutting tools.

Castings of PRK-33 eliminate up to 80% of machining.

Bar Stock and Billets in Stock. Drill Rods Furnished on Order. PRK-33 Forged to Specification.

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highest grade tool steels
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ALMOND THREE-JAW DRILL CHUCKS were the first to be placed on the market over Seventy years ago. As Pioneers in the field of Drill Chucks, the name "ALMOND" has long been associated with the logical procedure of machine developments. ALMOND DRILL CHUCKS are made in types and sizes to fit all machine tools and portable drills.

Complete information is available on request.

The Original Manufacturers of Drill Chucks

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Ashburnham, Mass., U.S.A.

From the day of their introduction to industry, gages of Cast Stellite Alloy by Woodworth have been earmarked for leadership. Today these tough, highly wear-resistant gages have attained leadership . . . through superiority *proved* in the service of industry.

Gages of Cast Stellite Alloy by Woodworth have a service life many times that of steel . . . gage life is increased up to 25 times. They are non-corrodible and non-magnetic, have a low co-efficient of friction, low affinity for other materials and a co-efficient of expansion close to steel.

Gages of Cast Stellite Alloy by Woodworth will remain accurate much longer than those made from any of 18 other materials tested.

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PRECISION GAGES • PRECISION MACHINED PARTS

Out of the Nation's War Plants Comes

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TRADE MARKS REG. U.S. PAT. OFF.

CRYSCOAT

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PROCESS

A low-cost chemical conditioning treatment for steel and iron surfaces and fabricated work that inhibits rust and solves the problem of paint adhesion

This new, scientifically engineered Oakite development, now successfully used on many different types of war matériel, can be employed on a wide variety of peacetime products to which paint and similar organic finishes are applied and where surface protection is a prime factor.

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Free Special Service Report Gives You Details!

A FREE 3-page Service Report gives you operating details, describes methods of application and the many advantages resulting from the use of Oakite CrysCoat No. 86. Write for your copy today.

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CLEANING FOR EVERY CLEANING REQUIREMENT

ATKINS

STILL PILING UP PROOF of "Silver Steel" Speed and Staying Power

614-P
ATKINS
Silent-Tool
SAWS
SILVER STEEL
Power Hacksaw Blade Cutting Report
8½ minutes the cut on 6" diameter No. 94100 steel, (equivalent to Temken No. 5200) with a variation of .005 to .008 was recorded for 6 tooth Silver Steel Power Blade, operated at medium speed of 100 strokes per minute, 275 pounds feed pressure, using sulphated oil cutting compound. 35 to 40 cuts secured per blade.

Make the Most of Modern Machines

Take full advantage of the cutting capacity built into modern power hacksaw machines. Use Atkins "Silver Steel" Blades to realize full returns on your investment. They cut faster, for longer periods.

● When, as in the case of Atkins "Silver Steel" Blades, record breaking production continues to be reported almost two decades after their introduction, it's clear proof that here are blades that are "right".

For the records of "Silver Steel" superiority keeps piling up. Whether the performance is gauged by cutting speed, as in the typical report cited... or long blade life... or fewer work stoppages for blade changeovers... Atkins "Silver Steel" Hacksaw Blades are up with or ahead of the rest. That's the result of the finest saw steel, fashioned by the industry's leading saw engineers into fast-cutting, long-life blades.

Have the advantages of "Silver Steel" performance in your plant. Ask us for complete cutting data.

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Tools Are Weapons... TREAT 'EM RIGHT!

RUST
PREVENTION
WITH TEXACO RUSTPROOFS
FREE! This 36-page booklet tells how Texaco Rustproof Compound prevents rust, where and how to apply it, and why it is so successful. Every industrial executive and engineer should have a copy. A single suggestion in this booklet may save thousands of dollars. Send for your copy today!

TEXACO

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT—CBS

PROOFING

A RECONVERSION REQUIREMENT..

IMPORTANT in any plan for smooth, speedy reconversion to peacetime production is protection of unused equipment against destructive RUST. Government-owned equipment, according to official specifications, must be rustproofed with minimum delay after "shut-down". And if the equipment is your own, you will likewise wish to protect it fully until it is disposed of or put back in use.

In either case, you will find *Texaco Rustproof Compound* and other Texaco rust preventives *thoroughly effective*—for weeks or years—in protecting costly machines, precision tools, and other production equipment. These tested-in-use products meet Government specifications for *exterior* or *interior* application.

Easily applied with brush or spray gun, *Texaco Rustproof Compound* provides a penetrating, self-sealing film which is not only waterproof but also resistant to chemicals and fumes. It remains plastic, healing over any scratches and abrasions. It is long-lasting and extremely economical.

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No matter what your rustproofing requirements—exterior or interior—there is a suitable Texaco rustproofing product to meet your needs, available to you through more than 2300 Texaco distributing points in the 48 States. *Order NOW!*

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Rustproofing Products

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Consult SYNCRO

the HOME of Precision and Production

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SYNCRO DEVICES, INC.

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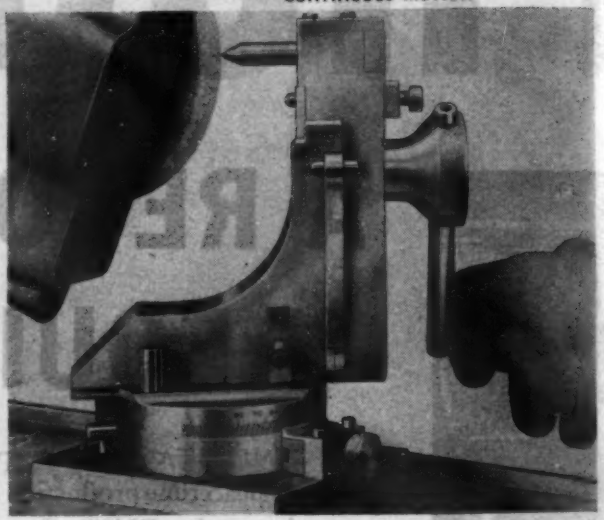
USE *Fluid-motion* for modern form-dressing

ONE SETTING HANDLE CONTINUOUS MOTION



The J & S Model "E" Radii & Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.

FEATURES

Fluid-motion dressing.
.0001" accuracy.
Automatic centering.
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14" wheel capacity.
Versatile and adaptable.

J. & S. TOOL CO.

477 MAIN STREET
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Universal Drill Bushings

Back in 1919 Universal Engineering Company originated the idea of standard drill bushings. Today, 25 years later, on their silver anniversary, Universal has grown from a small shop to a full fledged leader in the drill bushing field. Other Universal products include standard collet chucks, floating chucks, centering chucks, boring chucks, boring bars, grippets and plungers.

Fighter Plane Given by employees

20% Employees Bond deductions

UNIVERSAL ENGINEERING CO.

FRANKENMUTH, MICHIGAN

A "Tip" on Tips

If you're having trouble finding the right spot welding tip to do a tough job, Mallory may have the answer.

The Mallory line includes among its large variety of resistance welding electrodes, spot welding tips of shapes and sizes to suit practically every application.

They're made of Elkaloy* A, Mallory 3† metal and other Mallory alloys—designed to weld mild carbon and alloy steels, plated metals and non-ferrous metals, including aluminum and magnesium.

Standard tips of Mallory alloys, with their high resistance to annealing at elevated temperatures, avoid excessive "mushrooming" . . . cut costly "down time" for tip dressing.

Mallory standard water-cooled tip holders dissipate heat, maintain maximum electrode efficiency and speed up production. They are available in straight, offset and universal types for regular or heavy duty applications. Handy ejection devices allow a quick change of tips.

Write today for a copy of the Mallory Resistance Welding Electrode Catalog.

Registered trademark of P. R. Mallory & Co., Inc., for welding electrode material
†Registered trademark of P. R. Mallory & Co., Inc., for copper alloys

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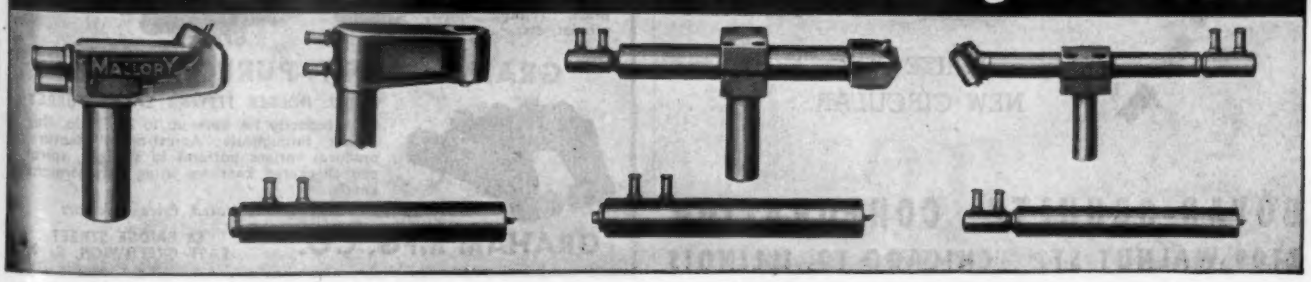
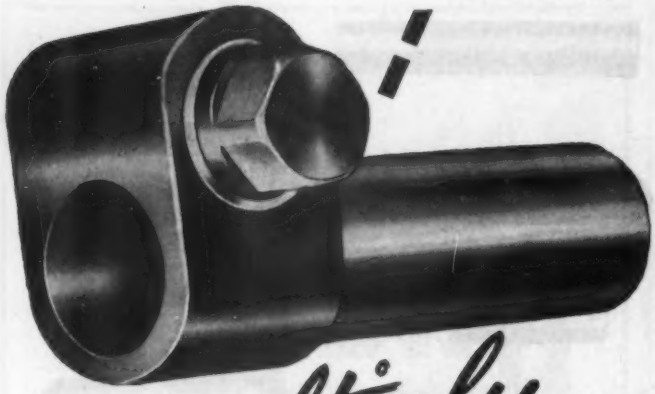
Reminder — Buy Another War Bond Today

P R MALLORY & CO Inc

MALLORY *Standardized Resistance Welding Electrodes*





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THE CAPACITY OF SCREW MACHINES WITH BOYAR-SCHULTZ

MODEL H PRECISION

ADAPTER

A PRECISION TOOL in every way, built to become a permanent part of screw machine equipment. It increases the flexibility of screw machines, making it possible to use more than one size tool on a single size machine.

With this Adapter, a Size 2 screw machine can accommodate Size 00 and Size 0 Tools. Size 00 Tools are readily used in Size 0 machines.

Made from the best obtainable alloy steel, it is hardened and ground to close tolerances to assure correct fit and will stand up under long, continuous service.

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REED KNURLS

More than 100 Different Styles and Sizes IN STOCK for Prompt Delivery. All Standard knurls now available in either CARBON Steel or HIGH SPEED Steel.

Special Knurls made to your specifications

New Catalog 62 Sent Upon Request.

REED SMALL TOOL WORKS
WORCESTER 2, MASSACHUSETTS

GRINDING WHEEL DRESSERS

Desmond Cutter

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We manufacture a complete line of Dressers and Cutters. Write for copy of catalog "A".

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URBANA, OHIO
Canadian D-S Mfg. Co., Hamilton, Ont.

For positioning plain and irregular shapes

With insertable special jaws, and numerous stops, guides and attachments, this vise is a ready-made jig for hundreds of uses. Sizes from 124 lbs. for planer, shaper, drill press, radial, miller, grinder, etc.

6", 9" & 12" Jaws

Sold plain or with jig attachments

GRAHAM MULTI-PURPOSE VISE

KNURL HOLDER FITTING LATHE TURRET

With capacity for work up to 2½" dia. this Holder, through its "Adjust-angle" feature, produces various patterns of straight, spiral and checkered knurling, using only straight knurls.

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With National Security Fully Served—

Johansson Gage Blocks

Available Without Priority

Johansson Gage Blocks, heretofore available only through AA-1 priority, are now available without priority.

The manufacture of chrome-plated Johansson Gage Blocks, discontinued since July, 1941 in the interests of meeting urgent production requirements for our regular steel Gage Blocks, has been resumed.

In accordance with the arrangements previously in force, worn sets of Johansson Gage Blocks may now be returned to the factory, on an exchange basis, for new chrome-plated sets.

This economical salvage service applies, of course, only to Johansson Gage Blocks, any of which (down to size 0.050″) can be surfaced accurately with chrome plating. Write for new Price Schedule.

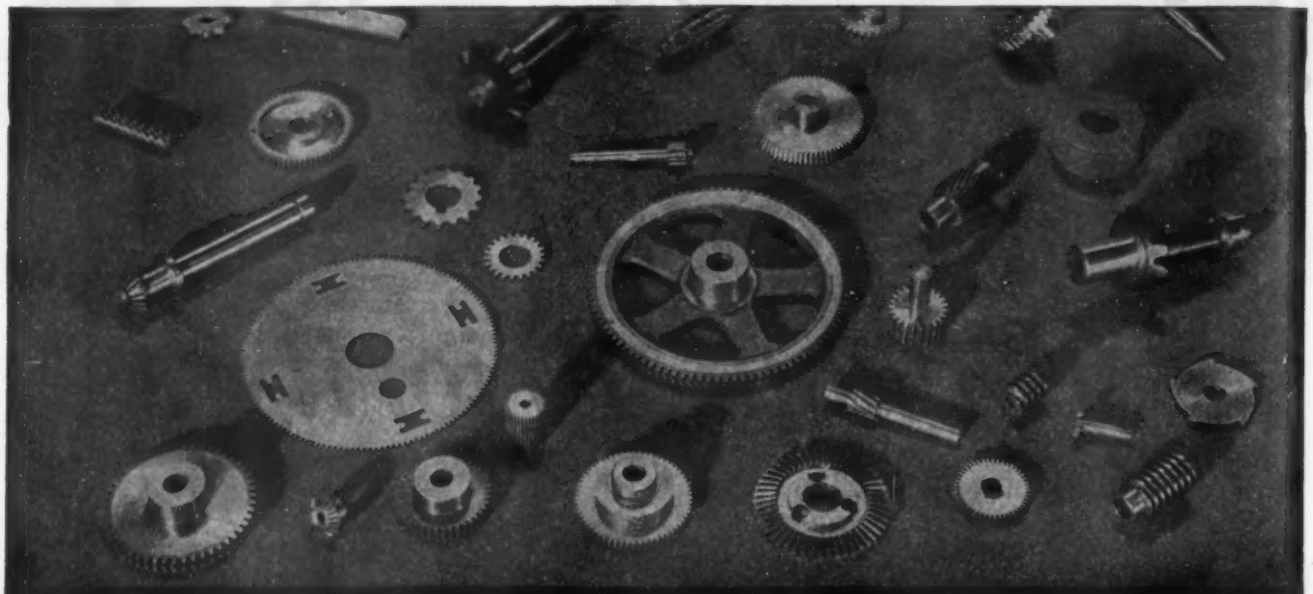
FORD MOTOR COMPANY, JOHANSSON DIVISION, *Dearborn, Michigan*

Ford

Johansson

GAGE BLOCKS

Quaker City Gears Are Rolling with the Armed Forces on All Fronts



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Accuracy lasts longer with new J-83 Gage Block Set!

TWO wear blocks of tough tungsten carbide protect the surfaces of the 81 alloy steel blocks. That's why the Janssen J-83 set of precision gage blocks stays accurate longer. Makes 120,000 gages in steps of .0001" from .200" to over 12". Skilled Jansson workmanship assures accuracy to .000008", .000004", or .000002".

Write for free copy of Jansson's 60-page "Handbook of Precision Measurement." Enthusiastically praised from coast-to-coast. For precision gage blocks, calipers, height gages, sine bars, tri-square, and special gages see Jansson, "The House of Precision", first.

JANSSON GAGE COMPANY

GLENDALE AVE. • DETROIT 23, MICHIGAN

Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on page 288 Aug. 17, '44, American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Los Angeles: A. C. Behringer, 324 N. San Pedro St., San Francisco: Guy Reynolds, 464 Vernon St., Oakland, Canada: F. Barber Machinery Co., Toronto, Canada.

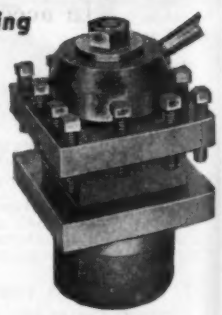
DIES GEO MET RIC *TAPS*

Right in the Lead

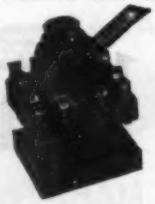
THE GEOMETRIC TOOL CO.
NEW HAVEN 15, CONN.

LYNN Precision Self-Indexing Tool Post Turrets

for Lathes from 9" to 30" Swing



Both tee bolt and bolt circle mounting with special base for all types of screw machine and turret lathe mountings. 4 separate operations in succession with one set-up. All working parts enclosed.



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PRODUCTION TOOLS THAT Perform!

1 **GORHAM Standard** for the Commercial Field

2 **GORHAM M-40-B** for Heavy Cuts in Hard Material

3 **GORHAM Gormet** for More Abrasive Materials

★ Today's business is assured because of the tremendous programs now in progress—tomorrow's business is just as sure because GORHAM Tools are building up a reputation for quality and performance.

Users show very good judgment when they keep coming to GORHAM for high speed steel tool bits. GORHAM Tool Bits are being used throughout industry in an ever-widening range of applications and this is building up preference.

• GORHAM Tool Bits are of superior quality because of our long experience in the selection and heat treatment of materials proper for the work the particular bit is called upon to perform. Get all the facts today on the widely-approved GORHAM line. Quantities in stock for immediate shipment—quick deliveries also on special sizes and shapes.

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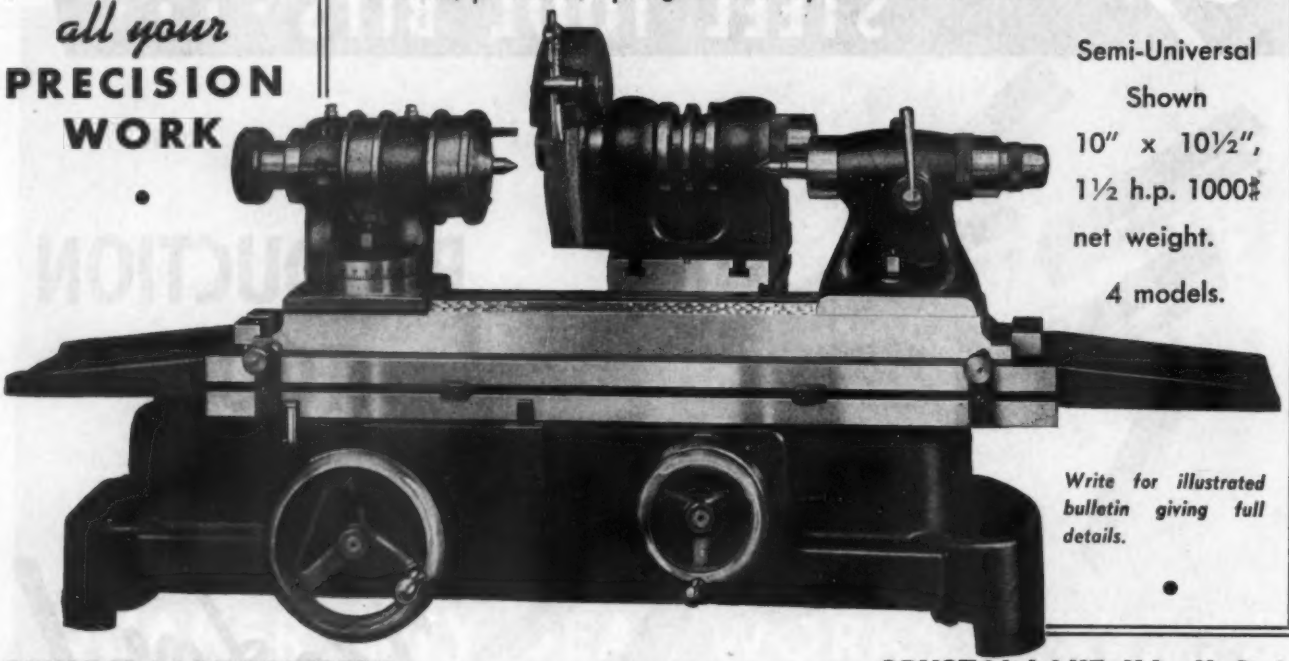
This **BENCH GRINDER** *will handle all your* **PRECISION WORK**

IF your work requires Micro Finish, grinding from .00001" to .000005" in roundness and size, use a Crystal Lake Grinder.

Smooth, powerful, Spring loaded separate motor drive.



Semi-Universal Shown 10" x 10½", 1½ h.p. 1000# net weight. 4 models.

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MANUFACTURERS OF PRECISION GRINDERS SINCE 1910.

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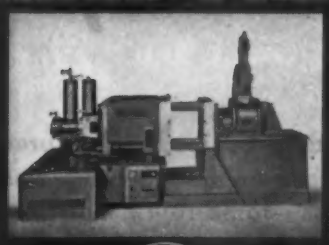

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DIE SINKERS •

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This lightweight sturdy Altair angle drive permits sharp bends in any flexible shaft connection. Swivels through entire 360° range. Will transmit power or can be used with remote control aplications. Serviced by merely removing central bolt without disturbing shaft connections. Write Department 7 for complete information. *Please indicate application desired.*

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North Hollywood, California

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Plain Plugs, Rings, Flush Pins, Built Up Snaps

OWN HARD CHROME PLATING PLANT

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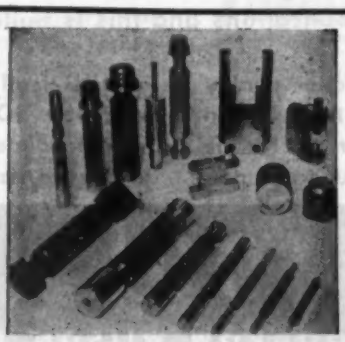

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Plain Plug, Ring — Taper — Progressive, Wire type — Flush Pins — Flat, Solid and Built up Snaps.

Adjustable Limit Snap Gauges.

Standard Thread Plug and Ring Gauges.

Special Gauges. Small Fixtures.

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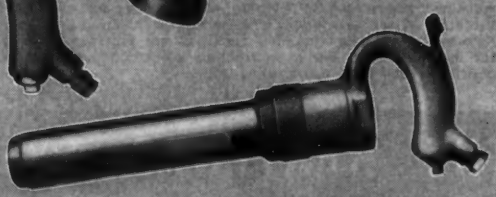

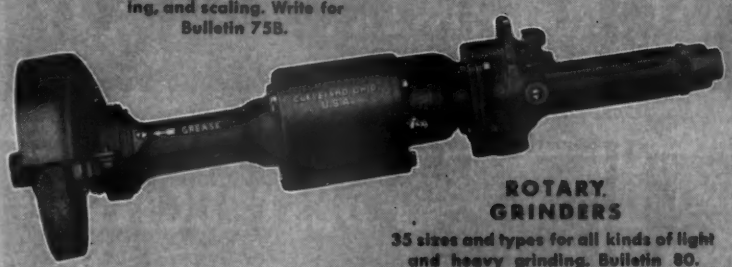

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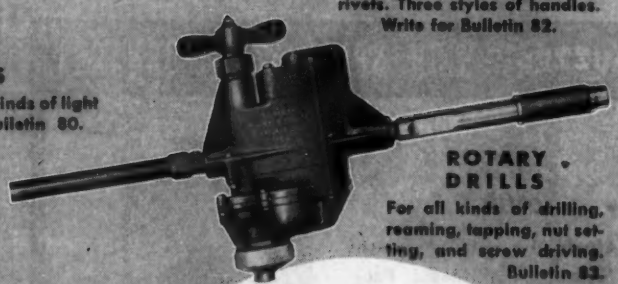
35 sizes and types for all kinds of light and heavy grinding. Bulletin 80.



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Model 41C, with "C" yoke, is a popular model among our squeeze riveters. Bulletin 85.

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Type "P", non-flying sheet holders clamp metal sheets together during riveting. Bulletin Type "P"

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With fast-working, air-saving Cleco Tools on the job, you will get top production now and for years to come. Every model among the wide variety of sizes and styles is backed by our half-century of experience in this field. Write for Bulletins.

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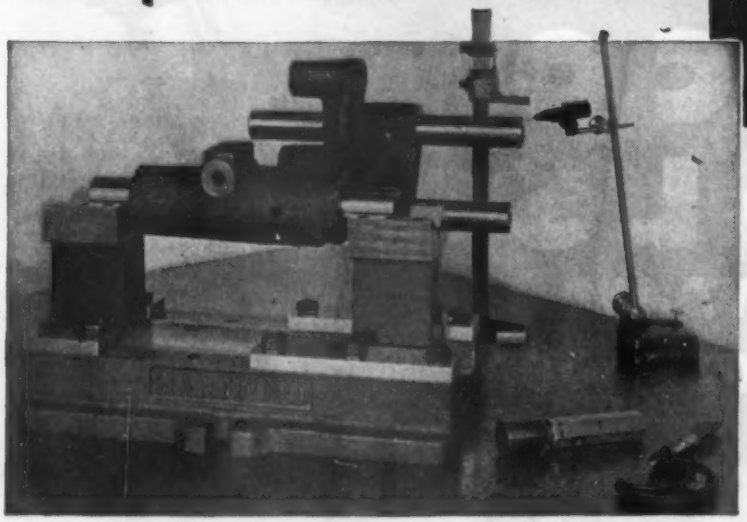
Inspection, too, can be facilitated with THE HARTFORD V-BLOCK FIXTURE



The HARTFORD V-Block Fixture is extremely simple, consisting of an accurately machined and scraped steel base on which are mounted hardened and accurate ground V-blocks. A set of clamps is included for holding test bars or arbors in place. Cross Keyways and ample clamping facilities are provided so that when the Fixture is used for holding work during machining operations it may be securely and accurately positioned and held on machine table.

Shown here, the new HARTFORD V-Block Fixture is being applied for set up purposes on a surface plate. Because of its adaptability to irregular shaped work, it provides inspection departments with a fast, accurate and simplified means for handling a wide variety of set ups. After the casting has been machined, it may be accurately checked for parallelism of bored holes and milled faces, as well as for accuracy of hole spacing.

Inspection is but one of several valuable services contributed by the HARTFORD V-Block Fixture. Setting up work for milling, boring and drilling can also be greatly facilitated with this convenient means of locating and holding irregular shaped work.

Write today for further details.

THE HARTFORD SPECIAL MACHINERY COMPANY

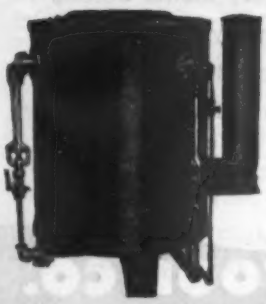
HARTFORD CONNECTICUT

"BUZZER" HIGH SPEED *Gas* FURNACES

2400 F.°

Attained quickly with "Buzzer" Full Muffle Furnaces designed primarily for heat treating high carbon and alloy steels.

NO BLOWER or POWER NECESSARY
... just connect to gas supply



"BUZZER" Atmospheric Pot Hardening Furnaces assure even heat up to 1650° F.

Used for Salt, Cyanide and Lead Hardening. Also adapted for Melting Aluminum.

Send for the complete "BUZZER" catalog today.

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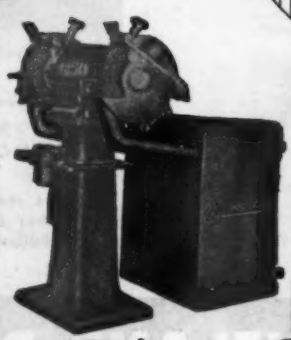
TINY . . . BUT DESTRUCTIVE!

Millions of tiny particles of dust and grit fly off unprotected grinder and buffer wheels daily. These deadly destroyers enter and injure the lungs of your em-



ployees. They cause breakdowns of expensive machinery by getting into sensitive moving parts and bearings. Eliminate them by installing the AIR MASTER at each buffer and grinder.

The Cincinnati AIR MASTER sucks the dust and grit right off the whirling wheels of grinders and buffers, leaving the air free from these destroyers of health and machinery.

The AIR MASTER is fully self contained . . . efficient, rugged, dependable. A size for every grinder or buffer. Write today for full details.

NOW AVAILABLE: Two, three and five H.P. grinders and buffers on AA-5 priority or better.

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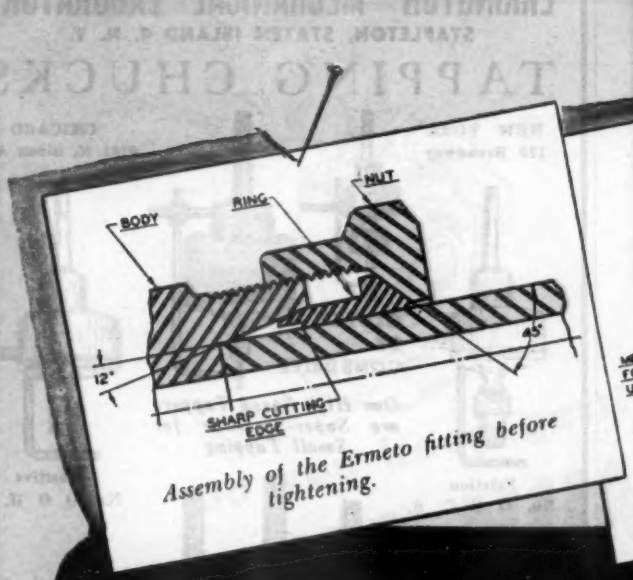
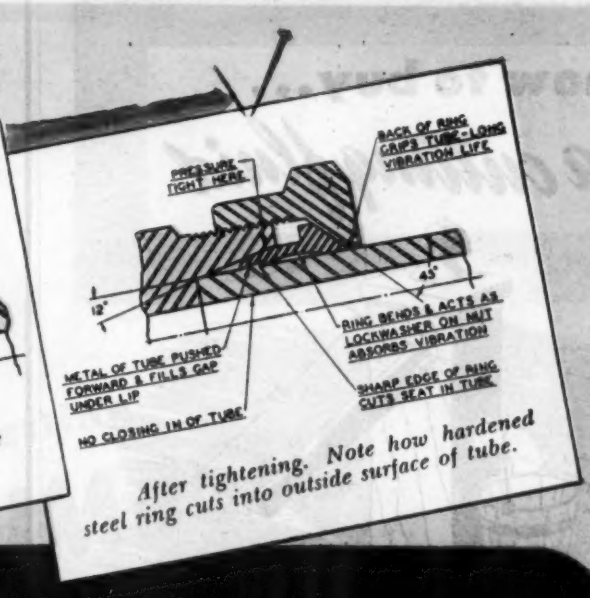
The Cincinnati Electrical Tool Co.
DIVISION OF THE R. K. LEBLOND MACHINE TOOL CO. CINCINNATI, OHIO
2676 MADISON RD.



Assembly of the Ermeto fitting before tightening.


PRESSURE TIGHT HERE
BACK OF RING GRIPS TUBE - LONG VIBRATION LIFE
12°
45°
RING BENDS & ACTS AS LOCKWASHER ON NUT ABSORBS VIBRATION
METAL OF TUBE PUSHED FORWARD & FILLS GAP UNDER LIP
SHARP EDGE OF RING CUTS SEAT IN TUBE
NO CLOSING IN OF TUBE

After tightening. Note how hardened steel ring cuts into outside surface of tube.

Ermeto

the fitting that eliminates { FLARING WELDING SOLDERING THREADING

Here's a fitting that is new—and news! The Ermeto Safety Fitting makes it possible to connect metal tubes quickly and effectively. And this is important: *Such connections will hold beyond the burst strength of the tube itself!* The joints have been designed and tested to withstand excessive vibration for an indefinite period without losing their original tightness. The Ermeto Fitting has proved its value in thousands of installations on hydraulic, oil, water, gas and fuel lines.

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THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries

Plants: Cleveland, Columbia City, Ind., Los Angeles
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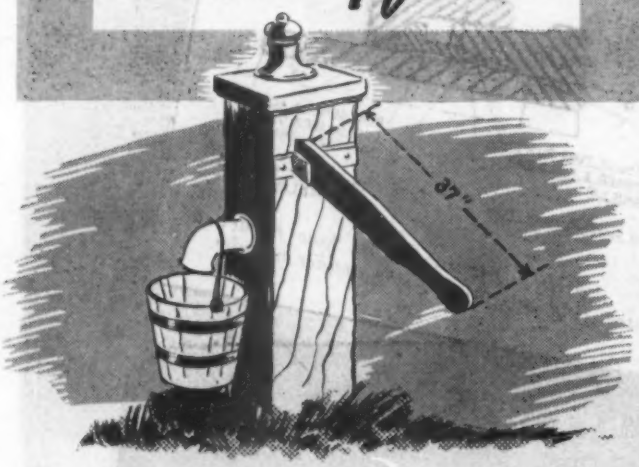
Free on request: **The fully illustrated, 28-page Ermeto Catalog is now available. Write for one today.**

how to buy... *a cutting fluid*



●"It's hard to tell the depth of a well by the length of the handle on the pump"... and it's even harder to tell the real worth of a cutting fluid by appearances alone.

For instance:

Lower viscosity does not necessarily mean more effectiveness at the work area.

Dark oils are often cleaner than light-colored, clear-looking oils.

More total sulphur does not always mean better cutting quality.

Straight oils are often better refrigerants at the point of contact than soluble products.

Long dilutions often outperform oils used straight.

The wise buyer measures cutting fluids by how they perform on the machine. To find the best performing oil for his needs, he looks to experience.

D. A. Stuart Oil Co., specialists in industrial oils since 1865, share their experience with thousands of such wise buyers. They stand ready to do the same for you.

WRITE FOR YOUR COPY

of the *New* Stuart 60 page handbook: "Cutting Fluids For Better Machining." It is full of data—information that you will find a helpful guide to the most efficient use of cutting fluids. It is free to executives and engineers.

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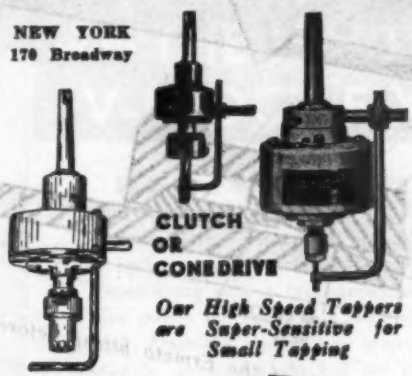
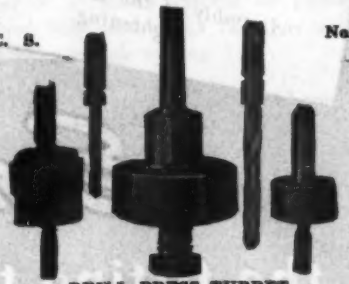


CLUTCH OR CONE DRIVE

Our High Speed Tappers are Super-Sensitive for Small Tapping

Friction
No. O O C. S.

Positive
No. O O H. S.



Style B Positive Stop Holds Work Down

Style C Graduated Adjustable Safety Friction

DRILL PRESS TURRET

Style D-E with Quick-Change Tool Holders to Drill, Tap and Set studs, etc., without moving work, or stopping or reversing machine. Individual friction adjustments in each tap-holder. If required.

Also, Opening Die-Heads; Opening Stud-Setters; Friction Secrew-Drivers and Nut-Setters, etc.

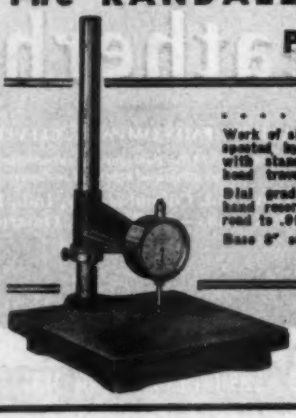
Model 1H

NUMBERALL
ROTARY STAMP

A single wheel Stamp for stamping figures and letters on brass, aluminum or soft steel; plastic, wood, with a single hammer blow. All figures on 1 wheel; entire alphabet on 2. One stamp replaces 12 individual, hand stamps. Characters furnished any size from 1/16" to 3/8". Also supplied with shank for press. Write for Bulletin AM-1H.

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

The RANDALL & STICKNEY
Platform Gauge



. . . . takes work up to 7 inches

Work of similar size can be quickly and easily inspected by setting gauge head at desired height with standard block or plug. Spindle on gauge head travels ½".

Dial graduated 0 to 50 in thousandths; second-hand records 10ths of inches. Can be furnished to read to .01 mm.

Base 8" square; height 13"; weight 18½ lbs.

Investigate Now!

RANDALL & STICKNEY
Waltham 54, Mass.

Do you keep getting

WRONG NUMBERS

on your Production Runs?

Do you get shortages and over-plusses in production from high-speed machines which can't be controlled by their operators because there's no way of keeping count on their runs? All these delays and errors that come from guessti-mating *in the dark* can be ended for good *in the light* of "Facts-in-Figures" supplied by Veeder-Root Counting Devices on each machine. These devices are inexpensive and easy to install . . . can be supplied in types to count in any terms or units required. Find out what Veeder-Root "Countrol" can do to help your work count for more. Write to Veeder-Root Inc., Hartford 2, Conn. In Canada: Veeder-Root of Canada, Ltd., Montreal. In England: Veeder-Root Ltd. (new address on request.)

You'll get nothing but RIGHT NUMBERS . . . with VEEDER-ROOT COUNTING DEVICES on your machines

Veeder-Root Large-Figure Counter, for easy reading from a distance. One of scores of types of Veeder-Root Counters for mechanical and electrical operation.

Another New Member of the

WALKER LINE

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Swiveling Type

PERMANENT MAGNETIC CHUCK

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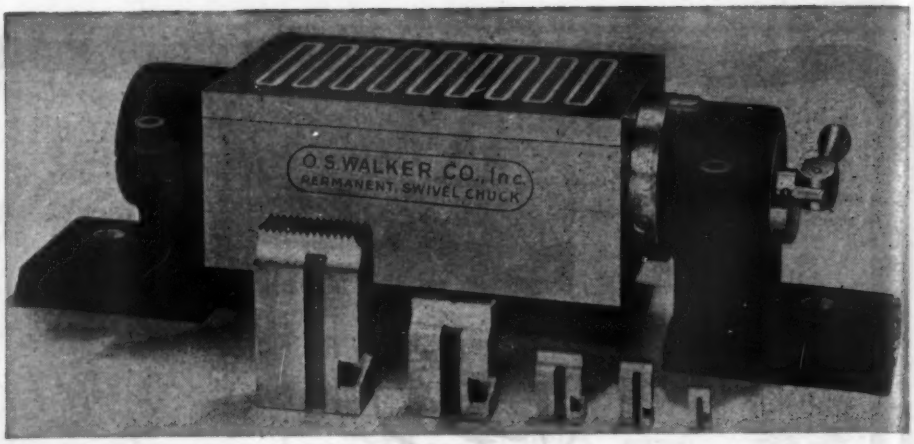

These new Permanent Magnetic chucks—with 35% more holding power, greater effective magnetic area, are the result of Walker's many years specialization. Their greater holding power is retained indefinitely.

In the new Swivel Chucks, a graduated dial is provided for accurate setting at any point over a swiveling arc of 180°. With only 1/16" between pole divisions, the top plate is totally magnetic, thereby contributing to greatly increased holding power assured.

This new development—in response to the demand for a permanent magnetic chuck having all the features of an electro magnetic chuck—supplements the regular Walker line of Walker Magnetic Chucks.

Walker Permanent Magnetic Swivel Chucks are available for early shipment in three sizes: 4" x 8"; 6" x 18"; 8" x 24".

Write today for Descriptive Circular.

O. S. WALKER CO. Inc., WORCESTER, MASS., U. S. A.

WHEN COLLET WORK IS INDICATED - SPECIFY

Precision Collets

For 10" ATLAS & LOGAN, SOUTH BEND, SHELDON, CRAFTSMAN, POWR-KRAFT, CLAUSING and other important lathes.

IMMEDIATE DELIVERY FROM STOCK

The *Precision* name on a collet is your unconditional guarantee of accuracy in machining, hardening and grinding. Make sure then to specify *Precision* when ordering from your dealer. Literature on request.

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- MODEL 3C: For 8" & 9" South Bend, Clausing, Hardinge No. 3, 10" LeBlond, etc.
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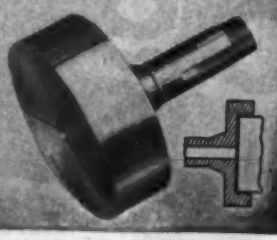
- MODEL 5C: For 9", 10", 16", 18" South Bend, 1" capacity Sheldon, Schauer, Sebastian, etc.
- MODEL 4C: For 14½" South Bend, ⅞" capacity Sheldon, Hardinge No. 4, Elgin, etc.
- MODEL 480: For Logan Screw Machine, Turret Lathe and attachments; Warner & Swasey No. 1, etc.
- BREN Collet: For Handwheel & Lever-Type Speedichek.

KLUTCH - KOLLET (Step Chuck) for chucking work to 2¾" diameter with collet accuracy. Head unhardened for easy boring. Fits 3AT, 3C, 1A adapters only. List unbored $7.50 each.



- 5C KLUTCH-KOLLET NOW READY. List unbored $10.50.
- PRECISION Collets also available in Hex. and Square.

GENERAL DIE-STAMPING-TOOL COMPANY • 262 Mott St., New York 12, N.Y.

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Let the SCLEROSCOPE speed up the production of that s so we can blow the Axis to HELL

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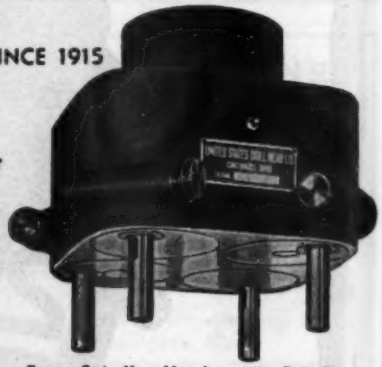
STANDARD US HEADS SINCE 1915

All Types of Fixed Center

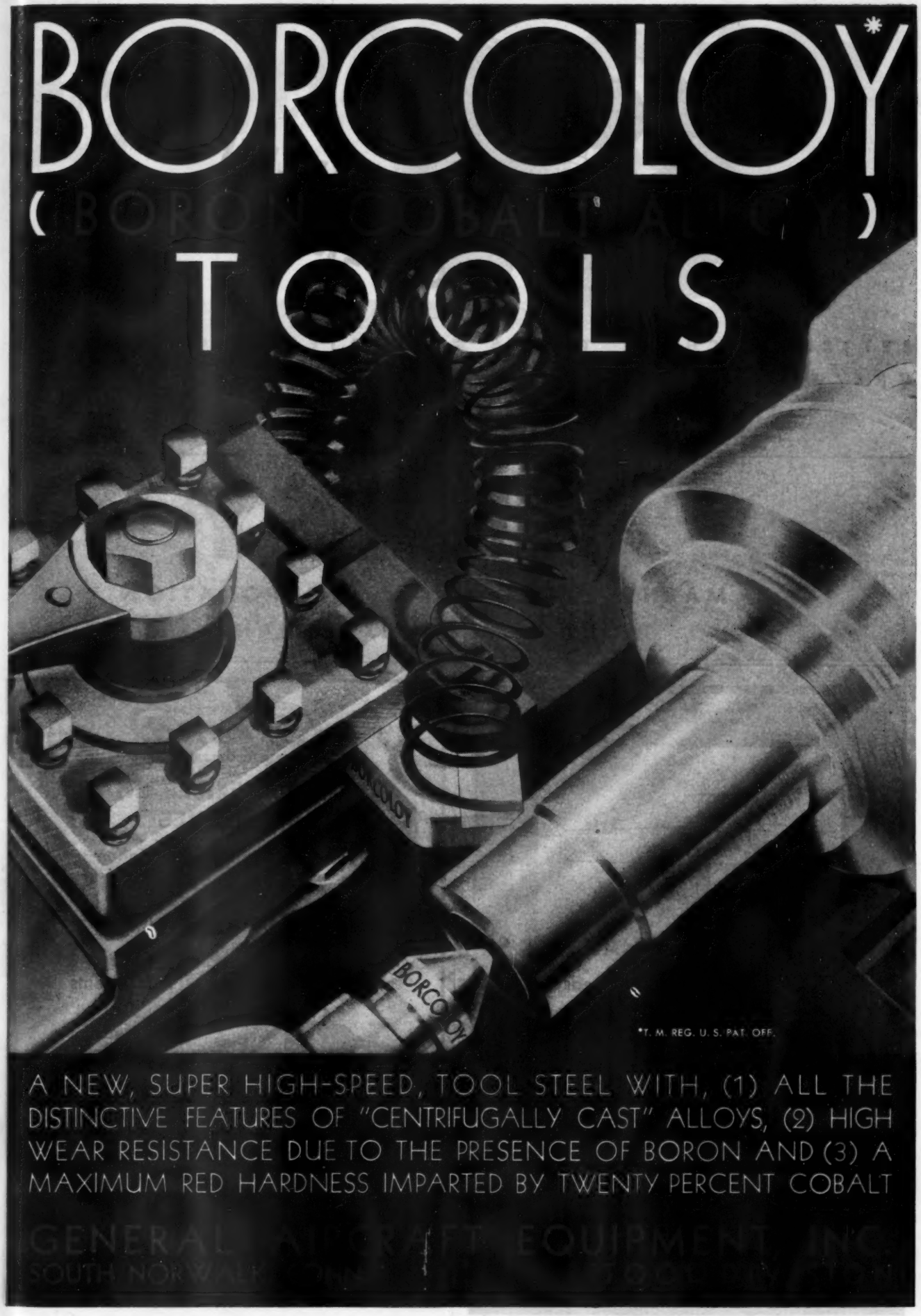
DRILLING TAPPING & BORING HEADS



Four Spindle Head. All Spindles Adjustable for equally spaced holes.

FIVE TYPES, 56 SIZES, ADJUSTABLE DRILL HEADS

UNITED STATES DRILL HEAD CO., CINCINNATI 4, OHIO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(BORON COBALT ALLOY)
TOOLS
BORCOLOY
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*T. M. REG. U. S. PAT. OFF.
A NEW, SUPER HIGH-SPEED, TOOL STEEL WITH, (1) ALL THE DISTINCTIVE FEATURES OF "CENTRIFUGALLY CAST" ALLOYS, (2) HIGH WEAR RESISTANCE DUE TO THE PRESENCE OF BORON AND (3) A MAXIMUM RED HARDNESS IMPARTED BY TWENTY PERCENT COBALT
GENERAL AIRCRAFT EQUIPMENT, INC.

BETTER MACHINE TOOLS = GREATER PRODUCTIVITY
GREATER PRODUCTIVITY = INCREASED PROSPERITY

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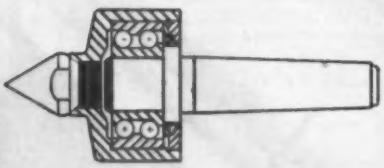
MACHINE & FOUNDRY CORPORATION
SOUTH BEND 23, INDIANA



SHORT OVERHANG

and accurate — at all speeds — *because* of short overhang and preloaded ball bearing. Point ground after assembly assures true center point.

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THE READY TOOL COMPANY
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1905 **Strand** 1944

STRAND FLEXIBLE SHAFT MACHINES

Used Throughout the Nation
High Quality Only
Vertical and Horizontal
⅛ to 3 H.P.

Attachments for Hundreds of Operations

Rotary Files
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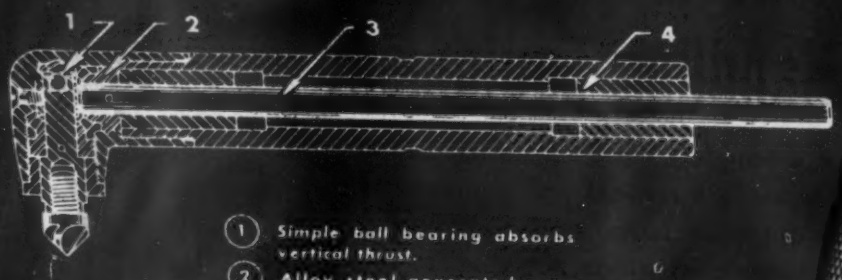
SCHRILLO CRAFTSMANSHIP

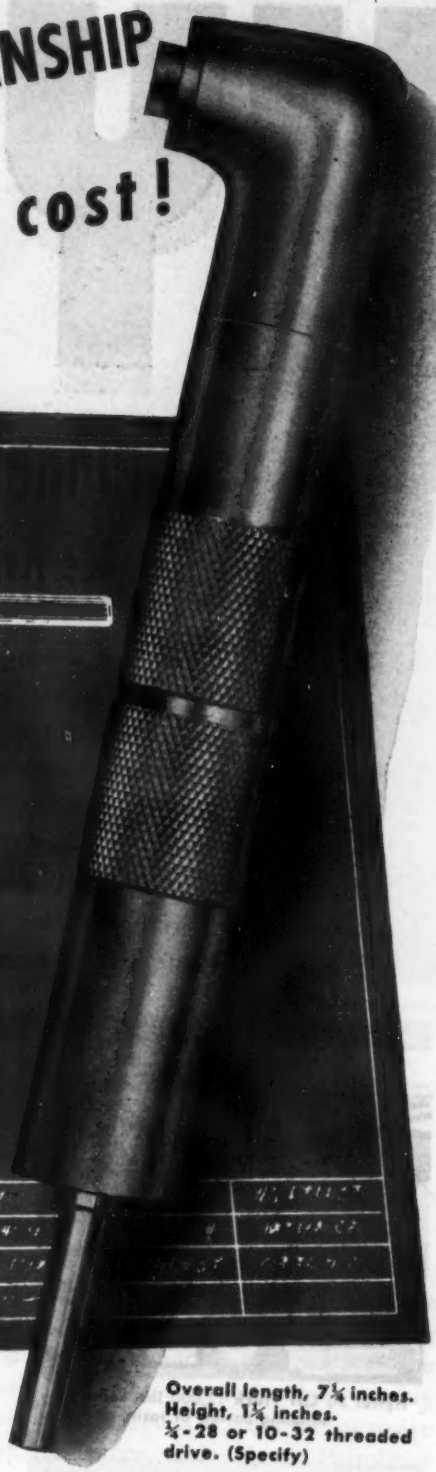
. . . at no added cost!



1. Simple ball bearing absorbs vertical thrust.
2. Alloy steel generated gears transmit the required r. p. m. quietly, efficiently.
3. Alloy steel shaft hardened and ground to assure long life under continual use and abuse.
4. Shaft bearings are self-lubricated.

The Schrillo Angle Drive has been developed and introduced for efficient and dependable usage in relatively inaccessible, "out of the way" places common to aircraft manufacture and maintenance. The assembly and all of its component parts are typical examples of Schrillo Craftsmanship featuring the finest of materials coupled with superior design and workmanship. This new development in the Schrillo line of precision tools is consistent with the character and quality of its previous introductions. Priced at only $16.00, without cutter, it will be maintained by the factory in first class working condition at a nominal charge. Immediate delivery out of stock. A complete stock of cutters* is also available. Order by the Tool Number: 1290 B.

*We solicit your inquiries on special cutting tools.



Overall length, 7¼ inches. Height, 1⅛ inches. ⅜-28 or 10-32 threaded drive. (Specify)

SCHRILLO

LOS ANGELES CALIFORNIA

HYSTER

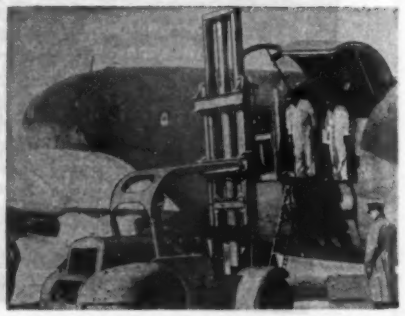
Pioneers in Materials Handling Equipment

Hyster is the name of a complete line of materials handling equipment. All models are gas powerd and equipped with pneumatic tires. They can hoist, move, stack, transport over rough road surfaces or smooth city streets, anything from light loads up to 30,000 pounds of material at a time.

Hyster means . . . *to hoist.* Hyster is an *action* name for *action* products. For 15 years Hyster has meant efficient, heavy duty service on materials handling jobs of all kinds. Hyster is a good product for your use in saving time—manpower, money.

Hyster 20 Lift Truck (2,000 lbs. capacity) handling barrels of rosin.

Hyster 75 Lift Truck (7,500 lbs. capacity) handling load of clamped plywood.



Hyster 150 Lift Truck (15,000 lbs. capacity) loading shipment on cargo plane.

Hyster Straddle Truck (30,000 lbs. capacity) handling lumber.

HYSTER COMPANY
Portland 8, Oregon
Sales and Service Offices in principal world cities

World's largest maker of tractor winches. Producer of equipment for "Caterpillar" track-type tractors.

Hyster Kerry Krane (10,000 lbs. capacity) handling "Caterpillar" tractor tracks.

How Industrial research solved another Wartime problem

Official U. S. Navy Photograph

The proper Lubricant here

proved right here

A FEW YEARS AGO a large manufacturer of cash registers sought a better lubricant than was then available. Containing as many as 14,000 precision parts which require lubrication, these machines must operate in a wide range of temperatures—from cold outdoor curb markets to hot cleaning and pressing shops.

When the problem was placed before Gulf technologists, they developed the answer—GULF PLASTIC PETROLEUM! This revolutionary new type of lubricant withstands temperatures up to 150° F. and yet acts freely at temperatures as low as —60° F. Its acceptance grew rapidly, and it was adopted by many manufacturers for lubricating delicate mechanisms. Then war came.

The Oerlikon antiaircraft gun—used by the Navy to knock down Axis divebombers—presented a difficult lubrication problem. In operating this rapid-fire weapon, a strong spring provides the power for feeding the shells into the firing chamber. This spring must be lubricated to permit free action under widely varying climatic conditions and to protect it from the corrosive action of salt air and spray. Gulf Plastic Petroleum proved to be ideal for this vital application—another example of how Gulf products and research are meeting the demands of industry and are helping in the war effort.

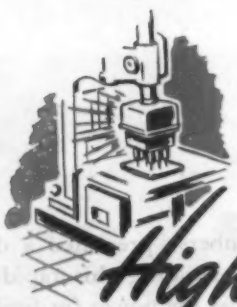
If you have a problem in any way connected with the use of a petroleum product, Gulf can give you effective help in finding the solution. Write, wire, or phone your nearest Gulf office today.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation · Gulf Refining Company · Gulf Building, Pittsburgh 30, Pa.

THRIFTMASTER

Your parts blueprints will bring recommendations and quotations. Literature on request.



High Production - Money Making

MULTIPLE SPINDLE DRILLHEADS

THRIFTMASTER PRODUCTS

DIVISION OF

ZIMMER-THOMSON CORPORATION

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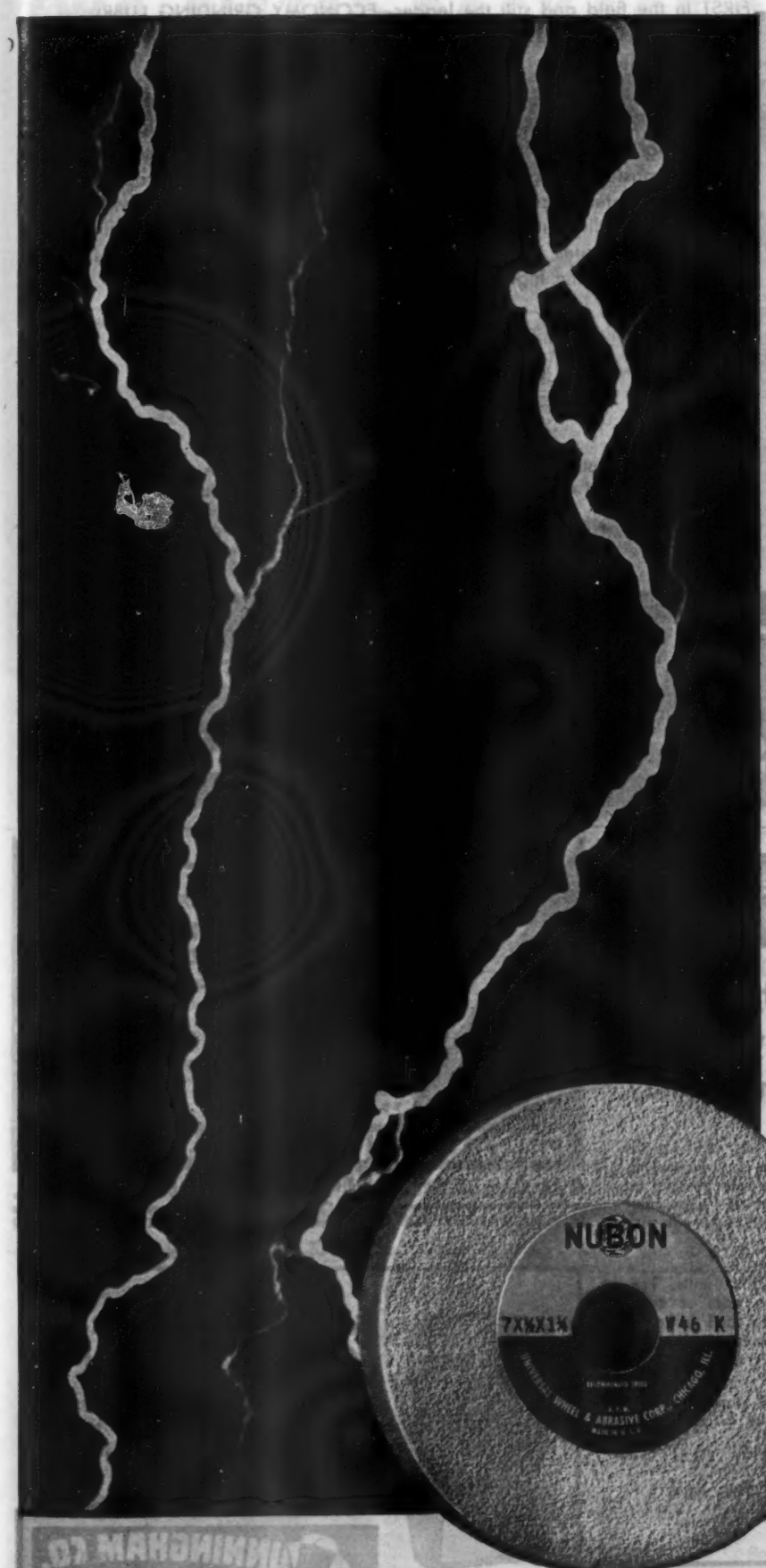


LIGHTNING *fast* DELIVERY

NUBON service is smashing all records—with guaranteed 10-day delivery of precision-built NUBON Grinding Wheels—even faster service in emergencies!

How are we doing it?—By our *Controlled Trial Plan* of engineering which assures accurate, uniform Grinding Wheels built to your specifications. Our plant is part of your laboratory! That's only half the story. Our *Special Bonding Process* saves precious hours in processing time.

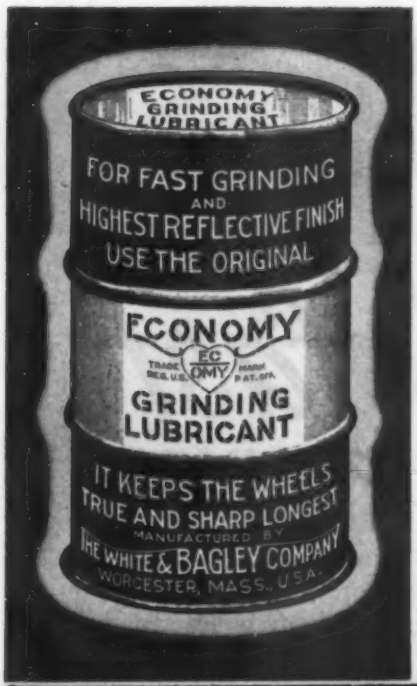
Here's what NUBON service means to you: CUSTOM-MADE Grinding Wheels you can depend on, when you need them; elimination of big inventories of useless wheels. No wonder more and more industrial leaders are turning to NUBON for fast, dependable service.

Send for your copy of our catalog.

UNIVERSAL WHEEL & ABRASIVE CORP.

2626 West Van Buren Street, Chicago 12, Illinois

NUBON 24 HOUR PROCESS GRINDING WHEELS AND STONES


ECONOMY GRINDING LUBRICANT
FOR FAST GRINDING AND HIGHEST REFLECTIVE FINISH USE THE ORIGINAL
ECONOMY
GRINDING LUBRICANT
IT KEEPS THE WHEELS TRUE AND SHARP LONGEST
MANUFACTURED BY
THE WHITE & BAGLEY COMPANY
WORCESTER, MASS., U.S.A.

FIRST in the field and still the leader—ECONOMY GRINDING LUBRICANTS pioneered by The White & Bagley Company in the early days of wet-grinding.

Successful in innumerable grinding operations, including work of large dimension, depending on positive cooling effect to avoid loss of dimensional accuracy through heat expansion. For water-soluble grinding, paste form grinding compounds and soluble oils, properly mixed with water, possess great cooling capacity. Here is the answer to the wet-grinding industry's demand for a lubricant that not only cools and lubricates, but makes possible grinding within the closest tolerance, giving the highest reflective finish.

For more than half a century The White & Bagley Company has specialized in laboratory controlled manufacture of oils and lubricants for all industrial needs.

"Grinding Oils and Lubricants" 1944-F-18. Write for it on your company letterhead.

THE WHITE & BAGLEY COMPANY

WORCESTER, MASS., Chicago, Detroit, Minneapolis

NATIONAL KEYSEATING MILLER

. . . the tool that converts drilling machines into key-seaters and saves time and money

• With this modern tool you can handle keyseating jobs not suitable for keyseating machines on any of your drill presses or radials. Keyseats with parallel sides, accurate in depth and in perfect alignment with bore axis are assured.

The National Keyseating Miller mills, keyseats in one cut. It can be used on taper holes, offset holes, blind holes and for taper keys. Work clamping is unnecessary. We also manufacture oil-grooving millers.

Made in twenty-six different diameters from ½" to 3½". Several widths of cutters can be used in each size.

WRITE TODAY FOR OUR NEW CATALOG NO. 15

NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

Grobet ROTARY FILES

HAND CUT MILLED CUT
GROUND FROM THE SOLID

There is a Grobet Rotary File, Cutter, Diesinkers Bur in shape, size, and coarseness of cut for every type of hard or soft metal, plastic, wood, etc. Send for Catalog DR. illustrating the complete line in full size, speed charts, etc.

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IMPORTERS OF GROBET SWISS FILES — MFRS. OF GROBET ROTARY FILES

SAFETY "WEDGE GRIP" STEEL HAND STAMPS

Ideal for mass production markings of defense products . . . trade marks and symbols. Any size or number of characters available.

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M.E. CUNNINGHAM CO.
SAFETY STEEL STAMPS
86 Carson St., Pittsburgh 19, Pa.

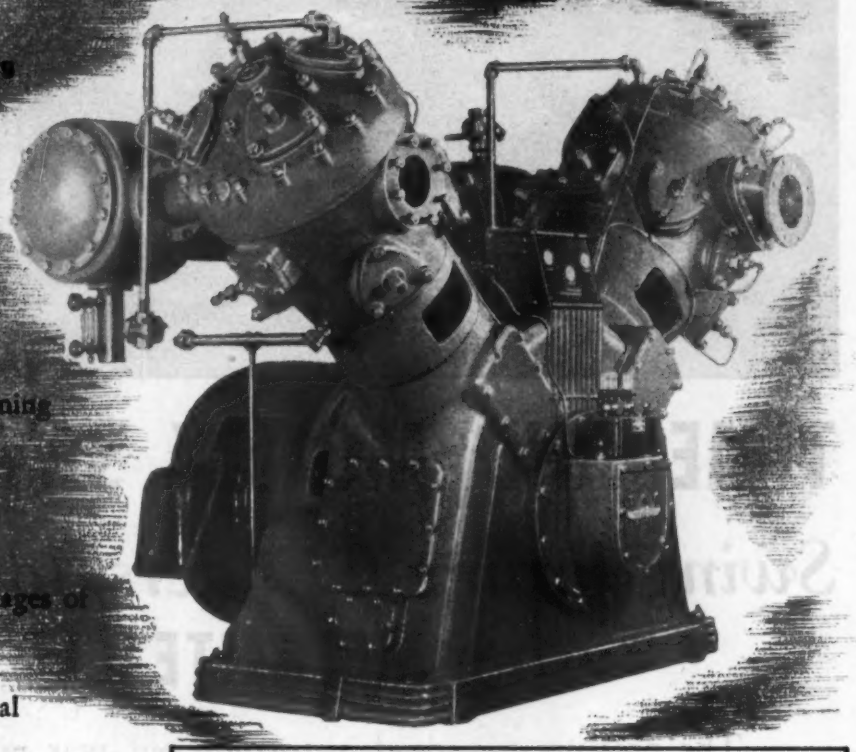
TWO-FISTED PACKAGE OF AIR POWER

This Worthington Huskie Comes All Ready for Quick Installation

★ **Automatic alignment—no erecting engineer necessary**

★ **No elaborate foundations**

★ **75% less foundation space than horizontals of the same capacity**



Worthington's new YC "packaged" air compressor needs no time-consuming reception committee. Saves time of engineers and installation crew . . . valuable man-hours!

In addition, you get four big advantages of "two-fisted" Y-design.

1. Higher speeds with balanced vertical Y-frame.

2. Safer installation even where subsoil under foundation is poor.

3. Accessibility of parts for quicker, easier periodic inspections, with large handy openings, outside valves and full-floating metallic packing easily reached.

4. Adaptable to many drives. Flanged type, synchronous or induction motors, directly mounted on compressor shaft. Easily arranged for Multi-V-Drive or for coupled drive from explosion-proof motor or practically any type of rotative power.

A WORTHINGTON EXTRA

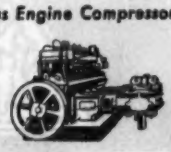
New line of Worthington bearings and connecting rods requiring no attention whatever . . . except oil.

Write for complete details. Bulletin L-667-B1. *Worthington Pump and Machinery Corporation, Compressor Division, Buffalo, N. Y.*

BEHIND THE NAME
WORTHINGTON

AC4-14

NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON



TIME AND MONEY SAVERS

Swing Frame Grinders, Idler Backstands using METALITE CLOTH *Belts*

The pressure for speed in turning out war materials greatly accelerated the installations of such machines—Swing Frame Grinders and Idler Backstands, both employing fast-running abrasive cloth belts.

But long before that, increasing numbers of plants had reaped the many benefits inherent in these modern mechanical aids that do better work faster and at much lower costs than old methods. In some cases four times the output, in others at a reduction of 75% in time.

These records forecast further and faster adoption of such time and money saving methods which could well have the prompt attention of all mechanical and purchasing personnel.

We will gladly supply information on the equipment (which we do not sell) as well as on the specially designed Metalite Cloth Belts (which we do).

Just a few lines on your letterhead.

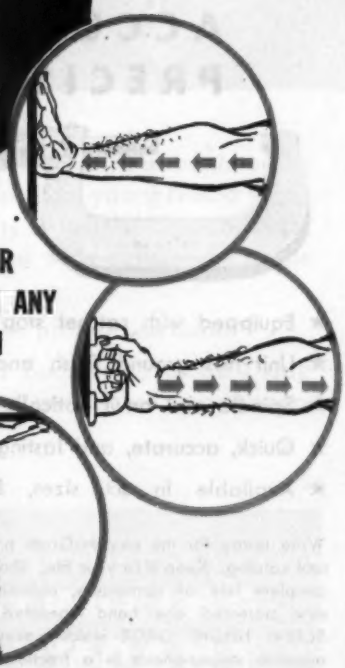
Offer valid only in U.S.A.

BEHR-MANNING • TROY, N. Y.

DIVISION OF NORTON COMPANY

Reliable Coated Abrasives Since 1872

SPEED PRODUCTION WITH THIS *mechanical manpower*



FOR POWER MOVEMENT IN ANY DIRECTION

To make the most of your manpower—and to obtain greater speed and efficiency in production—*eliminate muscular effort for mechanical movements* by applying T-J Cylinders!

Shop men everywhere today find that operations requiring any form of pressure—to clamp, press, raise or shift—can often be improved and simplified by doing the job with T-J Air or Hydraulic Cylinders! These Cylinders are built *right* to deliver maximum power movement in every stroke... with utmost dependability and long life. All surfaces are strictly inspected for squareness and smoothness. All mounting holes are drilled—not just cored. Available in many sizes and styles... write for latest T-J Cylinder catalogs.

The Tomkins-Johnson Company, Jackson, Michigan.

FOR TOUGH JOBS SPECIFY T-J

TOMKINS-JOHNSON

RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

VITRIFIED

Keep production on its toes by standardizing on . . . VITRIFIED GRINDING WHEELS

The Vitrified complete line includes also Silicate, Shellac and Resinoid bonded wheels for conditions requiring high finish, elasticity and heat resistance.

Grinding equipment—for tools or for production requirements—can be brought to higher degrees of precision and speed by standardization of Grinding Wheels

These objectives can easily be realized through the use of Vitrified Wheels for every grinding operation, because Vitrified offers a complete line of sizes, shapes and types, processed especially for the work to be handled.

. . . Cast Iron, Bronze, etc., can be ground at low cost and efficiency on Vitrified Carborite Wheels. . . . For accurate, fast grinding of steel on a production basis, Vitrified Borite Grinding Wheels increase output and reduce costs.

. . . Also, make Silicate, Shellac and Resinoid Bonded Wheels.

Ask a Vitrified representative to show you how economically you can modernize your grinding operations by standardizing on Vitrified Wheels.

Vitrified Wheels

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ACCURACY PRECISION

MICROMETER CALIPER

★ Equipped with ratchet stop and locking ring.
★ Unit has ground finish and lapped threads.
★ Spindle and anvil optically flat and parallel.
★ Quick, accurate, and lasting zero adjustments.
★ Available in six sizes, English or Metric.

Write today for the new McGrath precision tool catalog. Keep it in your file. Shows our complete line of instruments, including our new patented one hand operated LEAD SCREW HEIGHT GAGE which makes more accurate measurements in a fraction of the time. Address: Room 111.

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SAWS and FILES
METALS • WOODS • PLASTICS

Fits any ¼" Electric Drill, Air Drill or Flexible Shaft.
Chucks in Drill Chuck or Collet
Uses Ordinary Hack Saw Blades and Standard ¼" Shank Machine Files
Easily Used in Difficult Places
A Speedy, Accurate, Powerful Saw that is an essential tool for every metal or wood worker, machinist and mechanic.

All rotating parts are Ball Bearing and run in oil—no gears—no cams—always smooth running. Saw chuck holds firmly and aligns saw perfectly. A WYCO Guaranteed Tool—Send for Catalog on Complete Line of WYCO Profit Producing Tools and WYCO Flexible Shaft Equipment.

$35.00
Complete, with extra saw blade and ¼" round machine file

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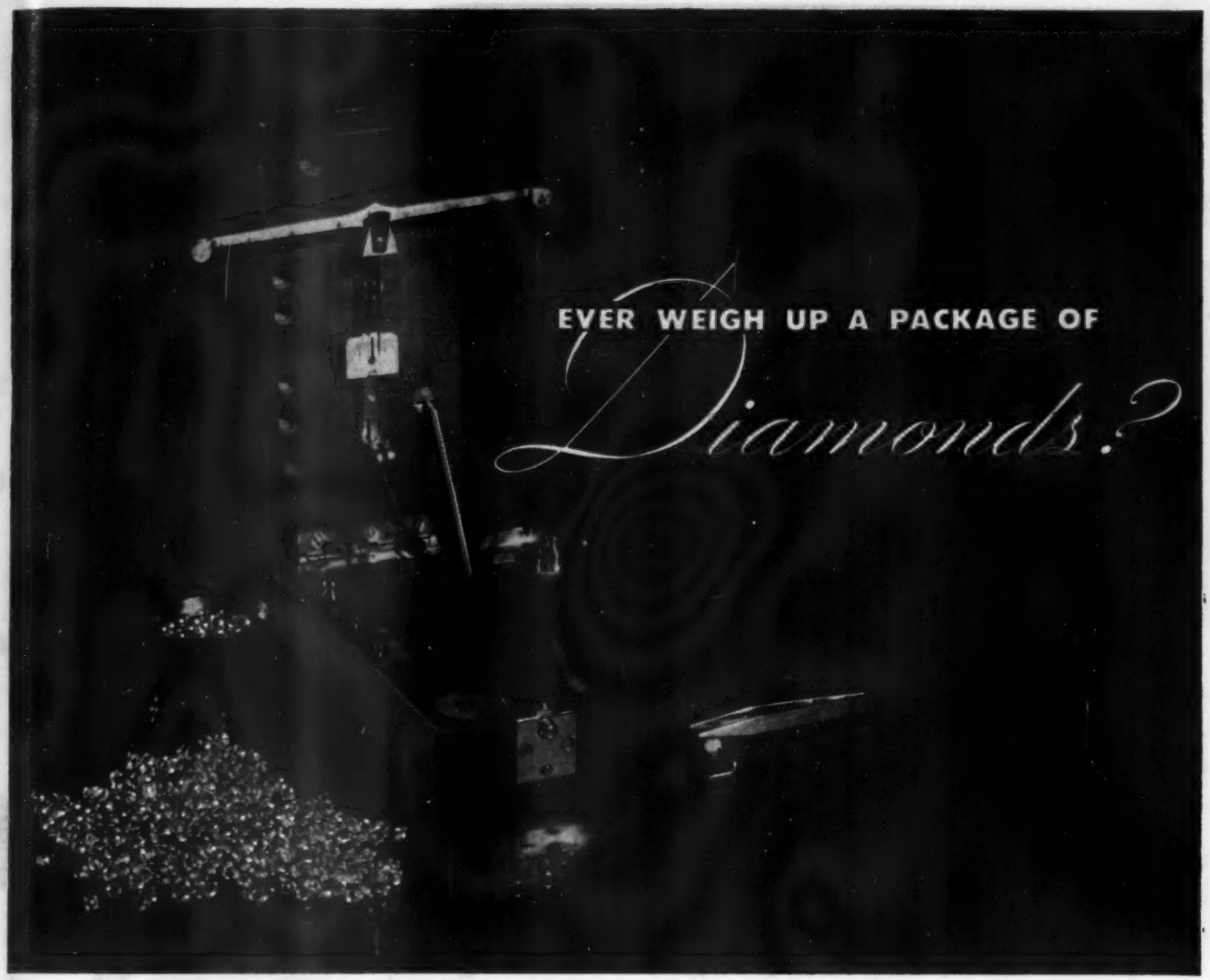

This ingenious little scale (which folds up and fits comfortably into the coat pocket) is a familiar sight on the desk of many a production man, purchasing agent and grinding room superintendent. It is part of the Wheel Trueing man's kit when he is showing the fine industrial diamonds for which Wheel Trueing is famous.

If you want to weigh up some of the stones, this little balance will give you the answer down to a hundredth of a carat or up to two hundred carats at a time. And, many thousands of carats of Wheel Trueing diamonds pass over these scales in the course of a year.

For, there are still plenty of diamond users who like to buy their diamonds unmounted and have been buying them that way from Wheel Trueing for more than a third of a century. And, there are many who have come to know Wheel Trueing so well that they leave the matter of selecting their diamonds entirely in our hands.

Wheel Trueing sales offices, located throughout the country, are equipped to show you splendid selections of the finest quality industrial diamonds and to give you the benefit of wide experience in the use of diamonds.

Your inquiry will receive prompt attention.

Send for a copy of our booklet "Tips on Using Diamond Tools." Every diamond tool user or operator should have one.

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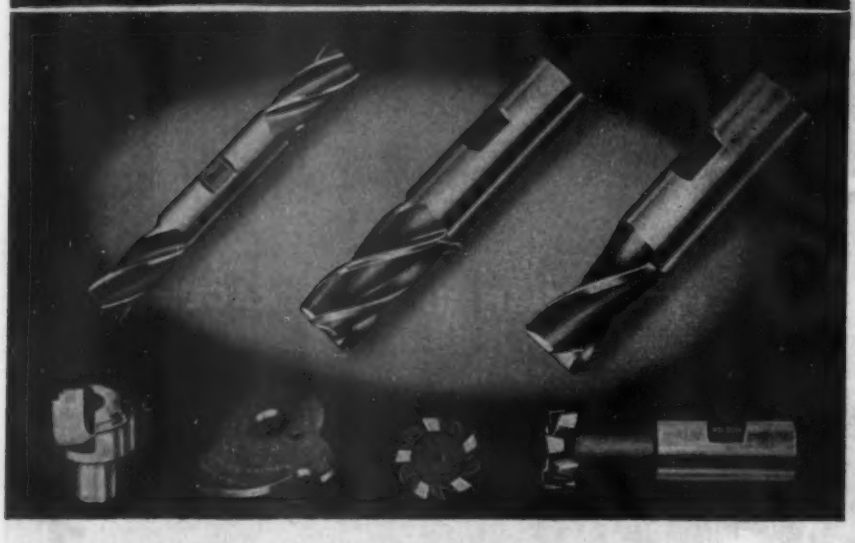
YESTERDAY'S PIONEER . . . TODAY'S LEADER



WELDON *Tools for* WELL DONE *Jobs*

Your cutting jobs can't be any better than your cutting tools. That's why in making WELDON Tools the emphasis is on *quality,* first, last and all the time.

No expense is spared on engineering, material and workmanship to insure the superior performance, strength and dependability of WELDON Tools. Their use is your first step in seeing that your cutting jobs are "well done".

Write for Catalog 8-B

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IMMEDIATE DELIVERY

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New High Speed
Long Length

DRILLS

No. by Gage	*Length*	*Our Price Net Each*
1 to 10	6¼	$ .75
11 to 20	5¾	.75
21 to 30	5⅜	.75
31 to 40	5¼	.75
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If you buy 60 drills or more — 20% discount

VICTOR
MACHINERY EXCHANGE
INC.
251 CENTER STREET
NEW YORK N. Y.

I never knew what Carbide could do, until I used TECO Cemented Carbide

- More pieces between grinds
- More grinds per tool
- Less down time
- Lower tool cost

Many a production man who was "satisfied" with his carbide tools has changed his mind when he changed to TECO Cemented Carbide. This harder, denser, more uniform carbide outproduces other carbides in job-for-job comparisons.

Prove it yourself! Put TECO Carbide Tools on any machine in place of present carbide tools. This simple change will produce more pieces between grinds—give more grinds per tool.

One of our tool engineers will be glad to study your needs and suggest the most suitable TECO tools and operating procedure. Meanwhile, send for complete catalog and price list.

IMMEDIATE DELIVERY FROM STOCK

can be made on most standard TECO Cemented Carbide Tools and Blanks!

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TECO CEMENTED CARBIDE

Pioneers in Tungsten Carbides for over a Quarter Century

1 PAYS FOR 2 IN 224 DAYS

★ A large airplane manufacturer* has two Model 48 American Chip Wringers. One is used to reclaim cutting oil from steel chips, the other to extract soluble oil from aluminum chips.

The first machine, by salvaging a barrel of oil a day, saves $9,125 a year. So, in 224 days, it paid off the investment for both machines. And that's over and above what the second machine saved by salvaging the aluminum chips which would be practically useless if the oil was not removed from them.

Wouldn't such savings be mighty welcome in your plant? An American Chip Wringer pays for itself so quickly, it would be good business to investigate. Just write. No obligation.

*Name furnished on request.

American Chip Wringers can be furnished in 5 different models.

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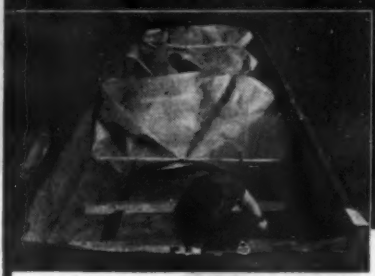
The AMERICAN LAUNDRY MACHINERY COMPANY

CINCINNATI 12, OHIO

May Enable You to Use A Crate Instead of a Case!



. . . or to ship in open cars

Decreased shipping cost, with definite assurance of protection from rain and dirt, has been achieved by many manufacturers who have used FIBREEN to line crates that replaced boxes. In some instances, wrapping with FIBREEN enabled the shipper to eliminate the crate.

Diesel engines, electric motors—heavy machinery of all kinds—are being shipped in low cost crates made possible by the use of FIBREEN. In the textile industry, FIBREEN has replaced as many as three different wrappings and the single thickness of FIBREEN gives greater protection at lower cost. Many products, formerly shipped in box cars, are now shipped in open cars and protected by FIBREEN.

Use FIBREEN for Small Packages

Small packages arrive at destination with contents unharmed by dirt or moisture when wrapped in FIBREEN. For shipments of parts, FIBREEN is especially desirable.

Get A Sample — Test It!

Get a piece of FIBREEN in your hands. *Crumple it!* See how it resists tearing! See why FIBREEN was so successfully used to protect war shipments from rain, ice, salt spray and dirt — and how its use can help *you* cut costs and protect your products in transit.

SISALKRAFT leadership is the result of the unmatched performance of its products for nearly 25 years, plus an engineering research service that has developed outstanding sisal fibre-reenforced papers and improved methods of packing and shipping.

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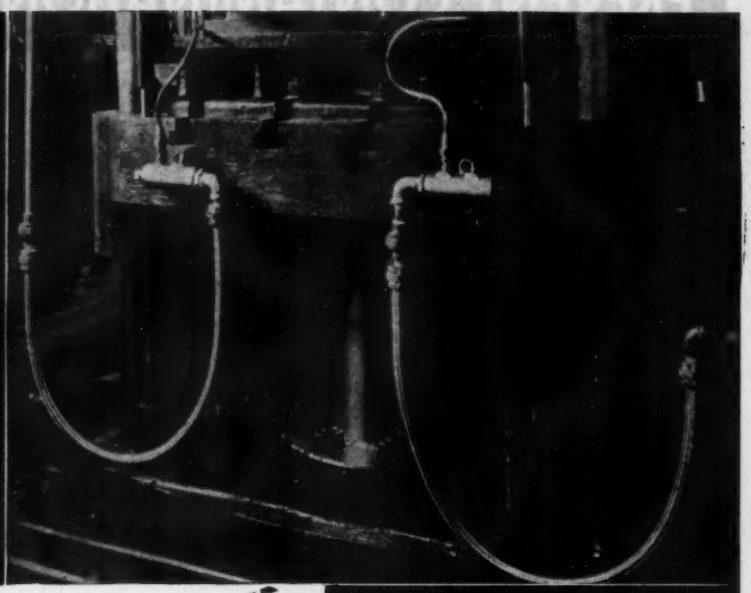
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

Send for a sample of FIBREEN *and data on its many applications.*

Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

SEAMLESS FLEXIBLE METAL TUBING



CONNECTS MOVING PARTS

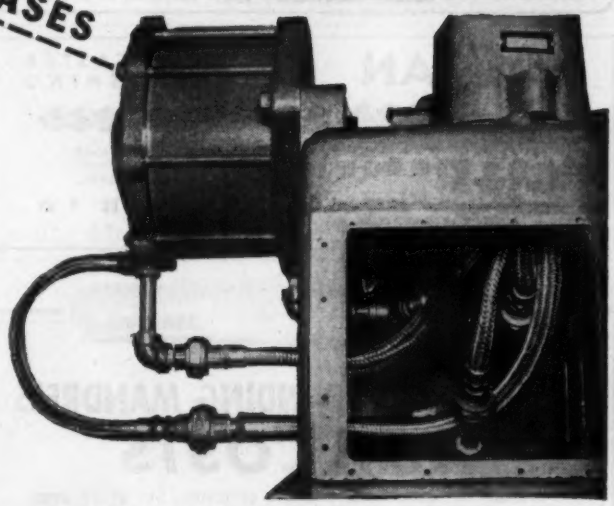
ISOLATES VIBRATION

CONVEYS LIQUIDS AND GASES

• *Where absolute tightness is essential,* American Seamless Flexible Metal Tubing is the most reliable type of flexible conveyor obtainable.

In literally thousands of industrial applications, American Seamless is solving a multitude of connecting problems where movement of parts, vibration and misalignment of machinery are factors . . . and in conveying gases, liquids and steam under a wide range of temperatures and pressures.

Our Technical Department is experienced in designing flexible metal assemblies for specific applications. If you have an unusual one, perhaps we can be of assistance. 44208



ANACONDA

American Metal Hose

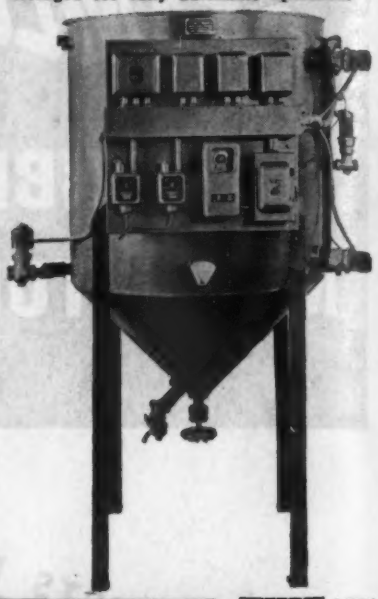
AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY • General Offices: Waterbury 88, Conn.
Subsidiary of Anaconda Copper Mining Company • *In Canada:* ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

BUY WAR BONDS . . . Buy all you can . . . Keep all you buy!

PREVENT CONTAMINATION – EXTEND TOOL LIFE

with the NEW BARRETT COMBINATION STERILIZER AND SEDIMENTOR for CUTTING OILS . . . .

Barrett Sterilizer and Sediment Precipitator arranged for fully automatic operation.



Protects your operators against infection—insures more and better work from your cutting tools—by sterilizing your cutting oils and precipitating sediment *at the same time.*

The NEW BARRETT STERILIZER AND PRECIPITATOR combines these two operations in one piece of apparatus which can be depended on to handle both operations effectively, efficiently and economically. Sterilization is by heat and is a positive active operation in the line ahead of the supply tank. By locating in this position, contamination is intercepted before the cutting oil is conditioned for safe, bacteria-free reuse.

Because of the heat to which the oil is subjected during sterilization, the viscosity of the cutting oil is reduced, thereby encouraging precipitation of minute heavy particles. The sediment thus liberated settles out and drops by gravity to the bottom of the sterilizer where provision is made to scrape the precipitated solids from the conical bottom and clean them out.

By thoroughly and constantly sterilizing and effectively removing solid matter, the Barrett Combination Sterilizer and Sedimentor reconditions cutting oil for reuse; sterilized for safety's sake and abrasive-free for longer tool life.

GET COMPLETE INFORMATION NOW

These units are available for floor, wall and post mounting and are furnished with semi-automatic or full automatic control as required. Send at once for detailed information on this timely Barrett development.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery

HOBART
"Simplified" arc welders
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"One of the World's Largest Builders of Electric Arc Welders"

HOLMAN *BETTER, FASTER HOLE FINISHING*

HELICAL TAPER PIN REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

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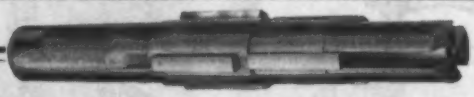
DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.



NICHOLSON EXPANDING MANDRELS

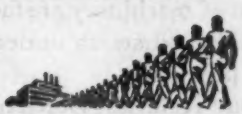
CUT COSTS

Because they save time, promote precision. Set of 19 does the work of 193 solid arbors, for all bores from 1" to 7". Hardened tool steel. Singly or in sets. Prompt delivery.

Recognized as Standard the world around

W. H. NICHOLSON & CO.
114 OREGON ST., WILKES-BARRE, PA.

TO INSTRUCT NEW MEN IN THE HANDLING OF DIAMOND TOOLS



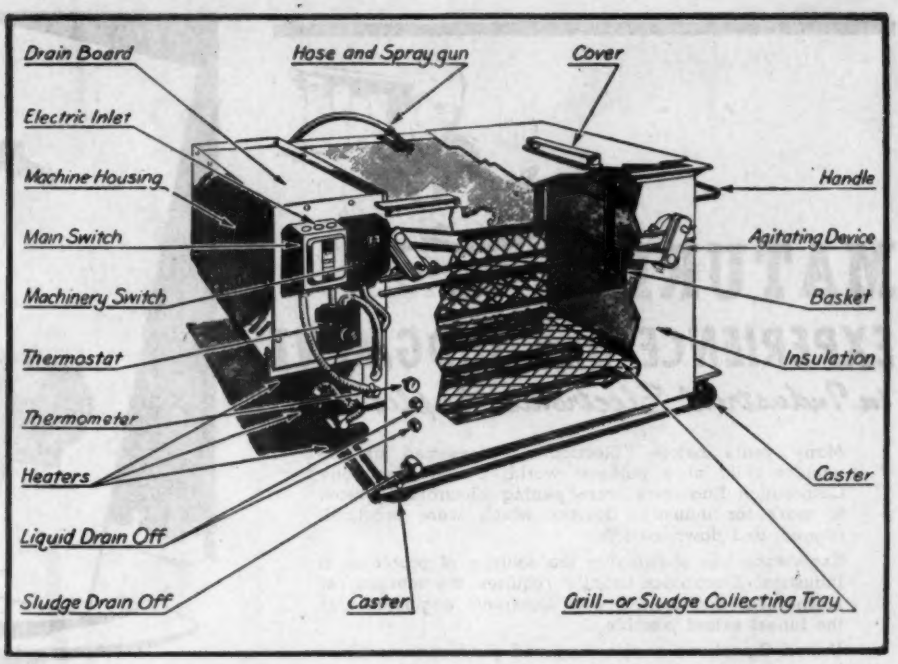
we will send you a valuable booklet. No charge, no obligation.

KOEBEL DIAMOND TOOL CO.
9345 Grinnell Ave., Detroit

KOEBELITE DIAMOND TOOLS

Multi - Point, Multi - Set, Multi - Edge, and Single Set. Diamonds for all Industrial Purposes.

Cleans Any Work — Any Metal with Any Cleaner



The New Magnus Portable All-Purpose Machine

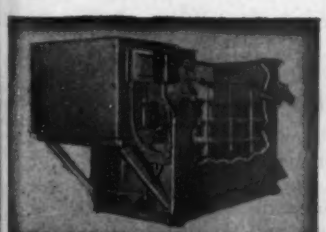
This new portable machine is made in such a wide range of capacities that a size can be selected to handle your work, no matter how large or small it may be. It can be used with any cleaner or cleaning method and hence is adapted to any metal. It is equally versatile in the many ways in which it can be set up to provide for cleaning sequences to fit your needs.

UNIQUE AGITATION

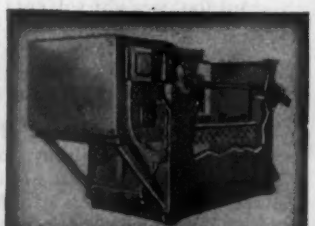
The method of agitation used on this machine insures far speedier and better cleaning. It is based on fast and repeated dipping of the work *in* the cleaning solution which provides an unusually thorough *swishing* contact of the solution with all parts of the work and its recesses. *Cleaning time has been cut by as much as 80% by this method of agitation.*

The price of this machine ranges from $300 to $800, depending on capacity and method of heating used.

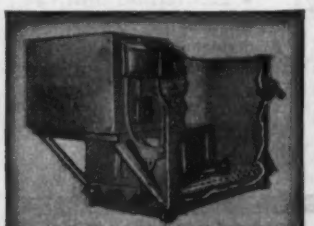
Ask for complete data folder, covering design, versatility, manifold uses and prices.



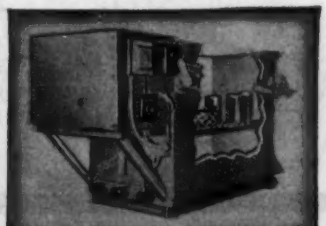
Machine without basket for soaking parts on racks or hooks.



Machine with basket for soaking parts individually or in bulk.



Machine set up for spraying parts on racks or individually.



Machine set-up for spraying parts individually or in bulk on a grille.

Magnus

MAGNUS CHEMICAL COMPANY • 60 SOUTH AVENUE • GARWOOD, N. J.

CLEANERS-METHODS-MACHINES

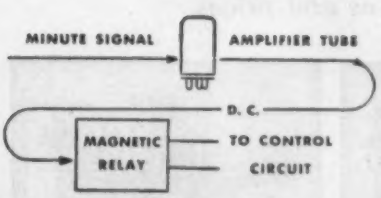
MATURE
EXPERIENCE and JUDGMENT
in Industrial Electronic Applications

Many years before "Electronics" blossomed as the wonder child of a postwar world, United Cinephone Corporation Engineers were putting Electronic devices to work for industry; devices which were practical, rugged, and down-to-earth.

Experience has shown that the solution of problems in Industrial Electronics usually requires the merging of Mechanical engineering with Electronic engineering to the fullest extent possible.

United Cinephone engineering and production facilities have proved valuable in many important industrial plants in connection with product control, automatic machine operation, operator safety and simplification of manufacturing methods.

Our engineers will welcome your inquiry. It will have every attention consistent with our responsibilities as Prime Contractors in the manufacture of military electronic equipment.



• ELECTRONIC SWITCH: For reliable switching where a tiny current can replace heavy currents or mechanical devices. Only 3/1,000,000 ampere will actuate the electron tube which operates the relay.

UNITED CINEPHONE CORPORATION

TORRINGTON, CONNECTICUT

DIP + AGITATION =
better batch cleaning of metal parts

The OPTIMUS Dip-Agitating Type Portable Washing Machine is ideal for cleaning, washing, paint stripping, anti-rusting, rust-proofing, rinsing, chemical treatments, coating, etc., wherever production, maintenance, or repair needs do not require a spray type machine.

To the soaking action in the cleaning solution is added a strong mechanical agitating action. The vertical up and down dipping motion of the load in and out of the liquid is effective in many cases in speeding up the cleaning operation, reducing time involved by as much as 50% to 75%.

Advantages

- Can handle any parts, in baskets on racks, or individually
- Can be used with any cleaning agent (alkaline, solvent emulsion, straight solvent)
- Easy handling of parts
- Fast cleaning
- Can be heated by any means
- Less wearing parts
- Portable, easily moved
- Agitation costs less than 2¢ per hour

OPTIMUS Spray-Type Machine

A spray washing machine of similar arrangement and portability, for the cleaning of relatively small series of large, heavy, parts in process of fabrication, or before, and during, maintenance and repair. Especially suited for handling of diesel, auto and airplane engines, compressors, pumps, motors, etc. Also, smaller parts in baskets, or on racks.

SEND FOR your copy of new Bulletin 4E2 "Batch Cleaning in Portable Metal Washing Machines". Bulletin 4E1 describing other "OPTIMUS Machines For Every Metal Washing, Cleaning and Drying Problem" also available.

OPTIMUS

EQUIPMENT CO.

MATAWAN, NEW JERSEY

Engineers and Manufacturers of Washing, Rinsing, Pickling and Drying Equipment for Metal Parts

PRESCRIPTION Rx
FOR WORK-WORN SHOPS

HALLOWELL

SHOP EQUIPMENT OF STEEL

This is the cure when your shop furniture has become down-at-heel and is worn out. "HALLOWELL" Work-Benches of Steel are available in 1367 ready-made interchangeable combinations. Of sturdy, long-wearing construction, these benches are built to stand firm and rigid *without* costly bolting to the floor.

Fig. 928. "Hallowell" Work-Bench with laminated wood top. Pilfer-proof drawer is extra. Patented and Patents Pending. Send for bulletin.

HALLOWELL STEEL STOOLS

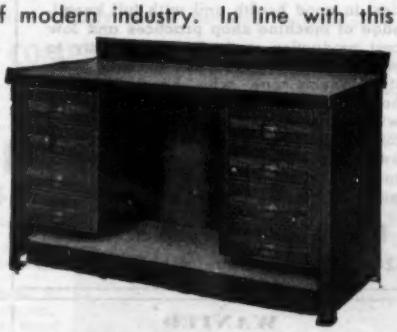
These stools are sturdy, wobble-proof and adjustable. Available in numerous styles, with or without backrest. Welded throughout and last a lifetime.

FOREMAN'S DESK

Very handy for working "on the run." Comes in several styles and heights. Can be supplied with pigeon holes or compartments, and a drawer as shown for keeping records under lock and key.

HALLOWELL *DeLuxe* SHOP EQUIPMENT

is designed especially to meet the complex shop requirements of modern industry. In line with this "Hallowell" DeLuxe Shop Equipment of Steel is standardized, so shelf, cabinet and drawer units are interchangeable.



STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 4 • BRANCHES: BOSTON • DETROIT • INDIANAPOLIS • CHICAGO ST. LOUIS SAN FRANCISCO

POSITIONS VACANT

MANUFACTURER OF centrifugal pumps and steam turbines has position available for man experienced in this line to assist in the supervision of machine shop. Requirements are thorough knowledge of machine shop practices and ability to eventually assume entire shop supervision. This is an old established business with good working conditions under young and progressive owner management. Now planning for after war business. Give details of qualifications and state starting salary desired. Dean Hill Pump Co., 4000 E. 16th St., Indianapolis 7, Indiana.

ENGINEERS, MECHANICAL draftsmen and detailers. Midwest manufacturer desires several engineers, mechanical draftsmen and detailers with heavy or excavating machinery experience for design and detail work leading to permanent engineering positions with responsibilities. Excellent post-war opportunity. WMC rules apply. P-955, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

MECHANICAL ENGINEER—Old established company now converted to pre-war production (Essential Products) has openings for mechanical engineer with some machine design factory layout, and installation experience. Excellent future possibilities. Give complete details of personal qualifications and work history in letter of application. Address P-956, American Machinist, 330 W. 42nd St., New York 18, N. Y.

TOOL DESIGNERS and draftsmen wanted by an old established company: Location, Central Ohio. Experienced in the designing of jigs and fixtures, also having wide experience in estimating the cost of manufacturing jigs, fixtures, special tools, special machinery and machining of parts for machine tools in addition to having had experience in routing and planning work going through factory. Give full particulars regarding your past experience, where you have been employed, length of time of employment, monthly salary desired and how soon would you be prepared to report for work. P-973, Amer. Mach., 520 N. Michigan Ave., Chicago 11.

EXPERIENCED DESIGNER wanted for small tools such as die heads, etc. Good opportunity with old established company. Give full particulars as to experience and salary desired. Application will be treated confidentially. P-971, Amer. Mach., 330 W. 42 St., New York 18, N. Y.

ASST. SUPT. 200 plant employees. Electrical equipment, fuses and switches. Age 32-40. Fine opportunity. Give fully age, experience, references, salary expected. P-969, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

PLANT MANAGER—New York Metropolitan district. Preferably in 30's or 40's with executive ability for established postwar plant manufacturing production products and special tool gauges and automatic machines, having 400 employees. Enclose history and photograph. P-984, American Machinist, 330 W. 42nd St., New York 18, N. Y.

(Continued on page 350)

FACTORY MANAGER

For branch plant of well-known eastern manufacturer located in San Francisco area employing one thousand people, making peace time product. Plant now in good volume production with assurance of continuation in postwar period. Modern shop, machining and assembling medium sized forgings and castings. Requirements are for man in early forties, in good health and with full knowledge of machine shop practices and low cost production methods; with ability to obtain efficient production of high quality poduct; one who has ability to handle labor and wants permanent job with opportunity to improve himself in long established organization. Reply in own handwriting giving full particulars in first letter regarding education, experience, family status and references.

P-979, American Machinist
520 N. Michigan Ave., Chicago 11, Ill.

WANTED

Progressive concern in Ohio seeking an engineer thoroughly experienced in designing small electrical household appliances. State age, education, experience and salary expected.

Our organization knows of this advertisement.

P-964, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

WANTED

Tool Designers Draftsmen Mechanical & Electrical Engineers

Excellent Post War Opportunities N. E. Ohio. Good Living Conditions W.M.C. Rules Apply

Address replies to

P-983, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

EXPERIENCED MECHANICAL ENGINEER

Engineer wanted with wide experience in designing and developing medium to heavy machinery. To be considered applicants must have had wide experience in Engineering and Development work and must be competent to direct and supervise all details.

An exceptional opportunity to become connected with a highly successful firm, up-to-date methods, and located in middle west, with good home and surroundings. For consideration, state in detail past experience, education, age, and salary desired. Interview will be arranged; all correspondence will be considered strictly confidential.

P-965, AMERICAN MACHINIST
520 N. MICHIGAN AVE., CHICAGO 11, ILL.

WANT SOUTH AMERICAN BUSINESS?

Seasoned Sales Executive planning postwar trip to establish Sales Agencies in Mexico and South America for 2 or 3 mfrs. Will operate wholly on commission and pay own expenses. Box

RA-994, American Machinist
330 W. 42nd St., New York 18, N. Y.

CONTRACT WORK

(Continued on page 349)

HAMMERED FORGINGS

Gear Blanks, die blocks, crankshafts, forged weldless rings, spindles, forgings of any shape or size.

Forgings machined and/or heat-treated. Immediate deliveries.

BISON FORGE COMPANY
115 MANITOBA STREET
BUFFALO 6, N. Y.

WIRE AND METAL SPECIALISTS

in round, flat, square and special shaped wire in all metals.

LARGE PRODUCTION CAPACITY
Plating and finishing.

EASTERN TOOL & MFG. CO.
BLOOMFIELD, N. J.

MACHINE SHOP WANTS DEFENSE WORK

SCREW MACHINE, LATHE, MILLING MACHINE, POWER PRESS, JIGS AND FIXTURES

FREEPORT MACHINE WORKS, INC.
124 East Sunrise Highway, Freeport, N. Y.
New York Office
16 East 52nd Street, New York 22, N. Y.

PRECISION FORM GRINDING

Specialists in grinding Circular and Flat FORM-TOOLS, FORM Counterbores, FORM Flat-Drills, and related types of FORM grinding. Also step-grinding of Tungsten and Molybdenum Rods.

Send Prints for Quotation and Delivery

J. & S. TOOL CO.—477 Main St.—E. Orange 1, N. J.
(Makers of J.&S. Radil & Angle Dressing Tools)

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them.

GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

REBUILDING

LET US REBUILD AND MODERNIZE YOUR MACHINE TOOLS

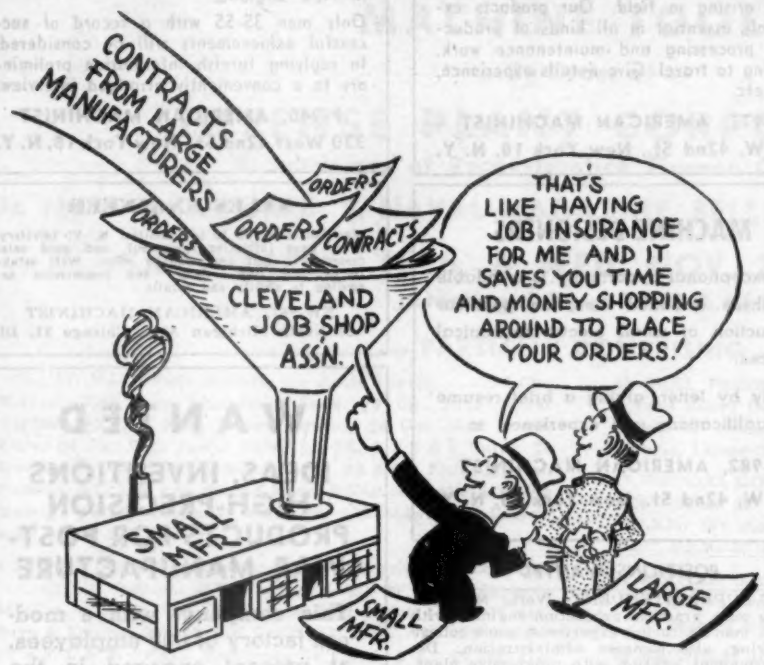
Our Methods of Rebuilding are similar to the Methods used by Manufacturers of New Machine Tools. Each Machine is Disassembled—Castings—Replaned — Hand-scraped — Spindles Reground and Bearings Refitted. All Worn-out Parts Replaced — including gears — Re-Lined and Machines Run in and Tested under Load.

We therefore are in a position to guarantee accuracy for our Rebuilt Machines to be Similar to new Machines.

We will design and build your Jigs and Fixtures.

VOLYN MACHINE TOOL WORKS, Inc.
149 BROADWAY, NEW YORK 6, NEW YORK

CONTRACT WORK



Cleveland Job Shop Association

THE Cleveland Job Shop Association consists of a group of operators of machine shops tool and die works—screw machine—plating—grinding and stamping shops. This organization functions on a "non-commission" basis for the purpose of acquiring contracts for the smaller shops and to aid large manufacturers in placing orders with shops best equipped to produce their job.

All information relative to the ability and equipment of each member is on file at the association office. To save time—insure better handling of your orders—obtain a better job—mail your blueprints or call

CLEVELAND JOB SHOP ASSOCIATION

Coordinators of Industry. A non-profit organization

418 Auditorium Bldg., East 6th & St. Clair Sts. **Cleveland 14, Ohio**

Main 3257

METAL STAMPINGS

• TOOLS • DIES •

PERMANENT MAGNETS

HEAT TREATING

THOMAS & SKINNER

STEEL PRODUCTS CO.

1103 E. 23rd St. INDIANAPOLIS, IND.

• Machines and Parts, • Special Tools and Fixtures, • Cam Milling, on Contract

Your engineering problems will receive efficient and economical service in our modern plant manned with skilled workers. Contact us today for prompt quotations on your blueprints or samples.

Designers and builders of wire and ribbon stock forming machines.

THE A. H. NILSON MACHINE COMPANY, BRIDGEPORT, CONN.

PLANT EMPLOYING 200 PEOPLE HAS PRODUCTION TIME OPEN

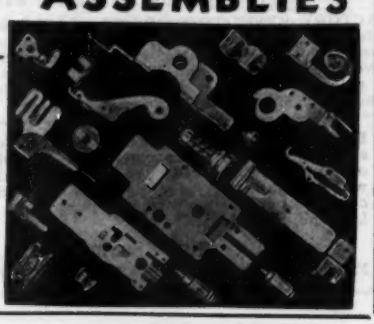
- CENTERLESS
- TURRETS
- MILLERS
- SHAPERS
- GRINDERS
- LATHES
- SUPPORTING EQUIPMENT

Over 200 Machine Tools

BERGEN MACHINE & TOOL CO., INC.

189 Franklin Ave., NUTLEY 10, N. J.

STAMPINGS AND ASSEMBLIES IN ALL KINDS OF METALS



Fast and efficient service on long or short runs is guaranteed by our modern equipment and methods, backed by 50 years of experience.

We also offer facilities for the manufacture of screw machine products, tools, dies, jigs and fixtures.

Quality work by skilled mechanics is assured. Send your blueprints or samples today.

"GREATER SAVINGS WITH GREIST"

THE GREIST MFG. CO.

546 BLAKE ST. **NEW HAVEN, CONN.**

ELECTRO-PLATING AND FINISHING EXPERT

Thorough knowledge and broad experience in electro-plating and metal finishing processes. Wanted to work with well established sales and service organization manufacturing products extremely essential in all kinds of production, processing and maintenance work. Must be willing to travel. Give full details.

P976, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

POSITIONS VACANT

(Continued from page 348)

WANTED TOOL room foreman with experience in compression, transfer, and injection molds to take charge of tool room for a fast expanding well known midwestern plastic molding plant. Excellent opportunity. Communicate at once giving all qualifications. P-985, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED SUPERINTENDENT or Works Manager small plant building machine tools. Opportunity for young man to demonstrate ability and acquire good income for post-war. Location Middle West. State experience, starting salary and particulars of education, training, etc. Confidential. P-986, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

SUPERINTENDENT WANTED—Company specializing in high-production stampings using progressive dies. Expansion requires man familiar with shop management, die design and manufacturing. Excellent postwar opportunity. State experience, age, educational background and salary desired. P-987, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

EXPERIENCED DESIGNER wanted for machine tools: Good opportunity with old established company: Give full particulars as to experience and salary desired: Application will be treated as confidential. P-988, American Machinist, 330 W. 42 St., New York 18, N. Y.

TOOL MAKERS wanted—3 or 4 experienced in screw caps and crowns. Good opportunity and good pay. P-989, 330 W. 42 St., New York 18, N. Y.

MAN EXPERIENCED in line of composition cork to take complete charge of plant. P-990, American Machinist, 330 W. 42nd St., New York 18, N. Y.

EMPLOYMENT SERVICE

SALARIED POSITIONS—This advertising service of 34 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details. R. W. Bixby, Inc., 366 Delaware Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

TOOL AND production design engineer, 49, well versed in tooling, metal processing, modern production methods and designing for economical manufacture. 23 years continuous engineering and machine shop experience, including 14 years on the Mech. Eng. faculty of a large University, over 4 years as Ass't Chief Eng. of a prominent metal products manufacturer. Past two years in key engineering position of large defense plant. Desire to make a steady connection with a reliable concern in an executive engineering capacity. PW-991, American Machinist, 68 Post St., San Francisco 4, Cal.

FACTORY EXECUTIVE, 46, with experience as factory manager, superintendent, chief production engineer and chief engineer on product development and design. Will consider position of major responsibility only. PW-959, American Machinist, 520 N. Michigan Ave., Chicago 11.

EXECUTIVE AND COMPTROLLER — seeks suitable postwar connection. Exceptional ability, training and experience metal working industry covering general and cost accounting, finances and purchasing. Location immaterial.

PW-981, AMERICAN MACHINIST
330 West 42nd Street, New York 18, N. Y.

WANTED

METAL SPECIALIST

Thorough knowledge metals, broad experience in metal manufacturing and finishing processes. Salesminded to assist sales and service organization on problems arising in field. Our products extremely essential in all kinds of production, processing and maintenance work. Willing to travel. Give details experience, age, etc.

P-977, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

MACHINE DESIGNERS

An exceptional opportunity is available for three qualified men, on post-war production of small electro-mechanical devices.

Apply by letter, giving a brief resume of qualifications and experience, to

P-982, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

POSITIONS WANTED

PLANT SUPERINTENDENT—Works Manager. Young man, practical production engineer with 11 years manufacturing experience, some college engineering, also business administration. Desires permanent location with progressive plant. Can direct and supervise tool and machine design, production and assembly processes, research, development, personnel, etc. Immediately available. PW-992, 330 W. 42 St., New York 18, N. Y.

SALESMEN WANTED

SALES ENGINEER—Nationally known power press manufacturer and allied equipment requires high grade sales engineer with broad experience in that field; will consider engineer without sales experience providing press and stamping experience broad enough to compensate; salary plus bonus; furnish complete record, education, experience, past earnings and references and recent non-returnable snapshot. Will not contact references until after interview. SW-972, American Machinist, 330 W. 42nd St., New York 18, N. Y.

WANTED, DIAMOND tool salesman to handle complete line of diamond tool products, exclusive representation, permanent position with oldest and one of largest diamond tool manufacturers in the United States. Tremendous post-war opportunities, drawing plus commission. Territories open—Chicago, Cleveland, St. Louis, and Pittsburgh; state age, education, and experience. SW-975, American Machinist, 330 W. 42 St., New York 18, N. Y.

REPRESENTATIVES AVAILABLE

TOOL LINES wanted. Sales engineer with 9 years technical sales and 16 years manufacturing experience desires several small tool lines for the Wisconsin territory in which he has an exceptional following. Prefers lines where engineering ability is required. RA-993, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

PATENT ATTORNEY

PATENTS, COPYRIGHTS. Booklet, "General Information concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite, 453, 815-15th St., N.W. Washington 5, D.C.

WANTED

THE HOOVEN, Owens, Rentschler Co. and The Niles Tool Works Co., Divisions of General Machinery Corporation, would like to obtain copies of its very old catalogs—those published fifty years ago and earlier. Anyone having copies please write to General Machinery Corporation, Hamilton, Ohio, giving description, date of issue, and condition.

WANTED

MACHINE DESIGNERS

Experienced on the design of special machinery. Excellent opportunity for first class men interested in steady positions in New England.

Only men 35-55 with a record of successful achievements will be considered. In replying furnish information preliminary to a conveniently arranged interview.

P-940, AMERICAN MACHINIST
330 West 42nd St., New York 18, N. Y.

SALES ENGINEER

Machine tools; 35 to 50; familiar N. Y. territory. Must have initiative, judgment, and good sales record. To sell and manage office. Well established, old line. Salary and commission according to ability and results.

SW-967, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

WANTED

IDEAS, INVENTIONS HIGH-PRECISION PRODUCTS FOR POST-WAR MANUFACTURE

This company, with a modern factory of 600 employees, at present engaged in the most exacting type of high precision tooling and war production, wants new inventions or products for post-war production. Can finance or consider outright purchase, or royalty basis.

Write New Products
Department B

PEERLESS TOOL & ENGINEERING COMPANY
1133 N. KILBOURN AVENUE
CHICAGO 51, ILLINOIS

WANTED

PRODUCTS OR INVENTIONS FOR POST-WAR MANUFACTURE

We will purchase outright or manufacture on a royalty basis, household, automotive, tools, or any specialty of recognized merit. We are a well organized and equipped metal working company. Write giving details of your product or item. Address

BO-953, AMERICAN MACHINIST
520 North Michigan Ave.
Chicago 11, Ill.

PATENT FOR SALE

Royalty basis. Patent #2318770. Bent wire clothes hanger with non-slip, non-wrinkle feature for trousers and skirts; no pins required to keep garment smooth.

R. M. D. FREEMAN
BOX 116 GOLDSBORO, N. C.

WANTED ADVERTISING — SEE PAGE 358

ABSOLUTE PUBLIC AUCTION SALE

FIRST RELEASE OF 400 GOVERNMENT OWNED MACHINE TOOLS!

— By Order of —

DEFENSE PLANT CORPORATION

A Subsidiary of Reconstruction Finance Corporation

***On the Premises of:* U. S. NAVAL MAGAZINE, BELLEVUE, WASHINGTON, D. C.**

***SALE DATES:* TUES. & WED. NOV. 28TH-29TH, 1944**

(Starting daily at 10:30 A. M.)

— PARTIALLY COMPRISING —

92 MILLING MACHINES: (Majority are motor driven). . . . ‡4 Cin. Vertical High Duty Intermittent Feed: ‡3 Cin. High Power Vertical: ‡2 Cin. High Power Vertical: ‡4 Cin. High Power Plain: ‡4 Cin. High Power Univ.: ‡1, 2A, & 3 B & S Univ.: ‡3 Kempsmith Univ.: ‡3H LeBlond Univ.: ‡2 B & S Plain: ‡2 Van Norman: ‡2, ‡3B, ‡4B, ‡6 and Model B Verticals: ‡2 P & W Die Sinkers: ‡2½B Milwaukee Verticals: ‡1B Milwaukee Universals: ‡12 P & W Profilers.

104 LATHES: (Majority are motor driven and quick change gear). . . . 42"x16' Putnam: 42"x24' H. S. & G.: 36"x16' Bridgeford: 36" Cin. 16 Spdle. G.H.: 36"x40' Leblond Boring Lathe: 36"x14' Boye & Emmes: 34"x14' L & S: 36"x18' N.B.P.: 30"x13' N.B.P.: 27"x10' L & S: 24"x14' American: 24"x10' B & E.: 24"x48"x10' Fay & Scott: 24"x14' Whitcomb Blaisdell: 24"x12' Ryerson: 24"x10' L & S: 20"x10' Bradford: 18"x8' Hendey: 18"x6' Oliver: 18"x8' P & W: 18"x8' L & S: 16"x8' P & W: 16"x6' Hendey: 14"x8' Hendey: 14"x5' Seneca Falls: 12"x5' P & W:. 12"x8' Hendey: 10"x5' P & W.

8 HORIZONTAL BORING MILLS (all arranged for motor drive). . . . ‡43 Lucas Precision, Table Type, 3" Bar: ‡33 Lucas Precision, Table Type, 4½" Bar: ‡31 Lucas Precision, Table Type, 3" Bar: ‡0 Giddings & Lewis, 3" Bar: ‡4 N.B.P. 5½" Bar, Knee Type.

6 PLANERS (Direct current, reversing motor drive). . . .84"x84"x24' Putnam, 4 Heads: 48"x48"x20' N.B.P., 3 Heads, Box Table: 48"x60"x15' N.B.P., 4 Heads: 36"x36"x12' N.B.P., 3 Heads, Box Table: 36"x36"x16' Hamilton, 2 Heads.

2 VERTICAL BORING MILLS: 120" Cin., Table Diameter 120", Rapid Traverse, Geared Feed, Variable Speed, Motor Drive; 100" N.B.P., Rapid Traverse, Geared Feed, Table Diameter 96", Variable Speed, Motor Drive.

8 TURRET LATHES: (2) ‡2 B & S, Wire Feed: (2) 2A W & S: (2) ‡4 B & S: (2) Hardinge Cut-offs.

10 RADIAL DRILLS: (Majority motor driven). . . . 6' Cin. Bickford Plain: 6' Amer. Full Universal: 5' Cin. Bickford Full Univ.: 5' Dreses semi Univ.: 4' Bickford Full Univ.: 4' Dreses Semi Univ.: 4' Fosdick Plain: 3½' Mueller Plain: 3' Western Plain.

23 DRILL PRESSES: (Majority motor driven). . . .‡25-36 Foote-Burte Heavy Duty: ‡216 Baker Heavy Duty: 20" 4 Spdle. Rockford: 20" Weigel: 20" Cin.: 4 Spdle. Henry & Wright B. B.: 2 Spdle. Leland-Gifford B. B. 12" Clark Bench.

27 VERTICAL SHAPERS & SLOTTERS: (Majority motor driven). . . . 36" Betts: 36" Bement Miles: 36" N.B.P.: 24" Bement: 18" N.B.P.: 18" Putnam: 18" Bement Miles: 16" Dill: 10" Newton: 10" N.B.P.: 6" P & W Tool Room.

14 SHAPERS: (Majority motor driven). . . . 60" Morton Draw Cut: 36" Morton Draw Cut: 32" Cin. 20" Cin. 20" G & E: 16" Cin.: 14" Potter & Johnston: 16" and 24" Traveling Head.

36 GRINDERS: 16" Heald Rotary Surface: ‡16—10"x72" B & S Cylindrical: 14" P & W, B.B. Surface: ‡4 Landis Univ. 16"x72": ‡2 B & S Surface: 22"x8"x12" Abrasive Surface: ‡2 B & S Univ.: ‡1 B & S Univ.: ‡60 and ‡72 Heald Internal: Rivett Internal: Asstmt. of Tool & Cutter and Pedestal Grinders.

10 PRESSES AND HAMMERS: 1500 lb. Chambersburg Self Contained Pneumatic, M.D. Nazel Type ‡571 Ferracute Straight Side, D.G. S.C. ‡503 Ferracute 16" Stroke, Tie Rod: ‡76½ Toledo Trimmer, 12" Gap. S.G.: ‡19 Bliss Inclinable: ‡4 Greenard Arbor Presses. 2500 T. Waterbury Farrel, Hydraulic Ver. Heading Press, with Pump, M.D.

OTHER IMPORTANT MACHINES: 42"x42"x8' Ingersoll Planer Type Miller, 2 Heads on Rail, 6½" Quills, Motor Driven, (2) 3½ Cleveland 4 Spdle. Automatic Screw Machines, with Chip Conveyors, M.D. (3) 1" Cleveland 6 Spdle. Automatic Screw Machines, with Chip Conveyor, M.D. 12"x12" Peerless Hack Saw, M.D.: 36" Espen Lucas Cold Saw for 10" Rounds: Dewalt Model GL Univ. Cut-off Saw: 18" Marvel Band Saw.

12 WOODWORKING MACHINES: ‡108 Berlin 15"x6" Moulder: Single Spindle Borers: Tenoner: Saw Table: 6" 4 Sided Moulder: Single Spdle Shaper, 24" Surfacer: 6' Swing Saw: ‡130 Woods Moulder.

SHEET METAL MACHINES: 42" and 52" Bench Folders: 36" Bench Rolls: Hand Shears: 8' Dreis & Krumpf 18" Brake.

. . . 3 and 5 Ton Chain Hoists, Chip Wringers, 6" Dust Collectors, U. S. Shoe Leather Splitter, and many other items.

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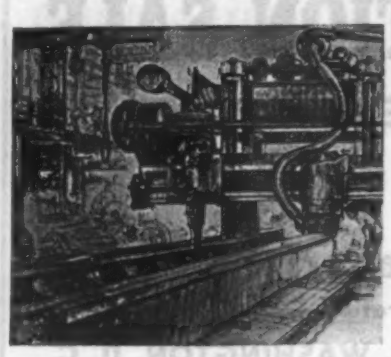

By Simmons

Every machine listed in this column is in our warehouse at press time.

42" BULLARD NEW ERA, 11000 serial
42" N.B.P. Car Wheel Borer
66" N.B.P. Vertical Tire Mill
27" BRIDGEFORD Axle Lathe
29" PUTNAM Axle Lathe
42" PUTNAM Car Wheel Lathe
2½" Bar CLEVELAND Horizontal, Table Type Boring Mill
2¼" Bar LUCAS Horizontal, Table Type Boring Mill, M.D.
5" Bar DETRICK-HARVEY Floor Type Boring Mill
4' HAMMOND Sensitive Radial Drill
7' AMERICAN Universal Radial Drill
BLANCHARD No. 16 Surface Grinder
33" x 9" G&E Spur Gear Cutter
No. 2 CLEVELAND Plain Miller
No. 3-B MILWAUKEE Plain Miller
No. 5-B B&S Plain Miller
No. 6 BECKER Vertical Miller
No. 10 N.B.P. Heavy Vertical Miller
30"x30"x12' INGERSOLL Planer Miller, M.D.
24"x24"x12' INGERSOLL Planer Miller, M.D.
24"x36"x12' INGERSOLL Side Head Planer Miller, M.D.
30"x36"x12' INGERSOLL Planer, Miller, M.D.
24"x24"x6' WHITCOMB Planer, one rail head, 230 Volt, D.C.
30"x30"x12' N.B.P. Planer, two heads, 230 Volt, D.C.
36"x36"x12' POWELL Planer, 4-heads A.C. Motor Drive
48"x48"x20' PATCH Planer, 4-heads, 230 Volt, D.C.
48"x48"x24' N.B.P. Planer, 3-heads, A.C. or D.C. Motor Drive
72"x72"x18' N.B.P. Heavy Planer 4-heads, 230 Volt, D.C.
60" Throat L & A Shear
RT-40 SCHULTZE-NAUMANN Beam Shear
5" Capacity U.E.F. Alligator Shear
72"—105-Ton L&A Multiple Punch
6"x⅝" SOUTHWARK Double Angle Shear
12" SELLERS Crank Slotter
20" SELLERS Crank Slotter
2" LANDIS Pipe Threader
6" BIGNALL-KEELER Pipe Threader

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LUCAS #1 Horiz. Boring Mill—3" bar, M.D.
BULLARD 24" Vert. Turret Lathe—with side head; R.P.
ROCKFORD 14" x 6' Geared Head Lathe M.D.
LANDIS 20"x220" Plain Cyl. Grinder—M.D.
G. & E. 18" Univ. Gear Hobber
GLEASON 3", 6" & 11" Bevel Gear Generators—2 tool type
GLEASON 10" Spiral Bevel Gear Generator
GLEASON 15" Spiral Bevel Gear Generator
K. & T. 3B Vert. Miller—Motor in Base
INGERSOLL 24" Cutter Grinder
INGERSOLL 26"x26"x12' Planer Type Miller
SAUNDERS 8-18" Pipe Threader
TREADWELL 12" Pipe Machine

LATEST TYPE MACHINE TOOLS — Built in 1942

DEFIANCE #25-A Horiz. Boring Mill—3¾" bar
GLEASON 12" Straight Bevel Gear Generator
GLEASON 3" Straight Bevel Gear Generators
MOREY #2G B.G. Turret Lathe—1" cap.

ALL MOTOR DRIVEN AND INCLUDING 3 phase, 60 cycle, 220 volt, A. C. motors

GRAY 36"x36"x10' Planer—2 heads
GRAY 44"x36"x10' Planer—3 heads
GRAY 60"x48"x14" Planer—3 heads
N.B.P. 48"x36"x14' Planer—3 heads—box table
L. T. SCHAEFER 100 ton Horiz. Hyd. Forcing Press
LYND FARQUHAR 26" Openside Crank Planer & Shaper
GISHOLT Precision Balancer
ESPEN LUCAS #138 Cold Cutting Saw—Cap. of blade 12"
SLEEPER & HARTLEY Coil Winder
CINCINNATI Gear Burnisher

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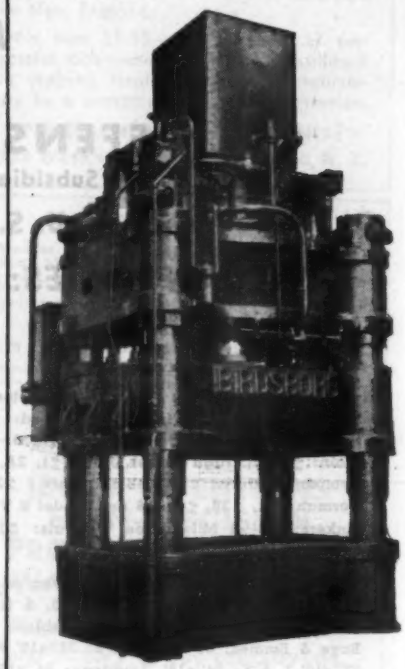

High speed, 28" downward moving ram, 70" x 60" platens, 36" opening, 18" stroke with 125 H.P. Aldrich Vertical Triplex Motor Driven Hydraulic Pump. Capacity 75 G.P.M. — 2000 lbs. per square inch.

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"C" frame, made by United Engineering and Foundry Co.

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L & A 10' x 3/16".
#672 Niagara, 72" x 10 ga.
Lennox Splitting Shear, 8' throat, 3/4" cap., arr. M.
Lennox Bevel Shear, 3/4" cap., arr. M.D.

PRESSES

#4 Bliss D.C. B.G. Forging 4" stroke.
#4 1/2 Bliss D.C. B.G. Forging 4" stroke (2).
#4 1/2 Bliss 3 column B.G. 3" stroke.
#5 Bliss D.C. B.G. Forging 3" stroke:
#74 1/2 Bliss S.S. geared, 2" stroke.

BORING MILLS

100" Niles-Bement-Pond Bor. & Turn. Mill.
Vertical, 48" Gisholt.
Hill 4" Bar Horiontal Table Type.
Horiz. #36 Landis-Rochester, 3 1/2 Bar Floor Type—Floor Plate 72" x 120".

DRILLING MACHINES

Weigel 22" B.G., Sl. Hd., tapping, P.F.
Superior 26" B.G., Sl. Hd., tapping, P.F.
Avey, 2 & 3 spindle Prentice, 4 spindle.
Henry & Wright, 6 spindle.
Leland Gifford 2 spindle.
Woodward & Rogers 6 spindle.

RADIAL DRILLS

4' Arm 11" Col. Cincinnati Bickford
5' Arm 11" Rd. Col. Cincinnati Bickford.
5' Arm 13" Rd. Col. Cinn. Bick. air clamp.
7' Arm 13" Col. Cincinnati Bickford

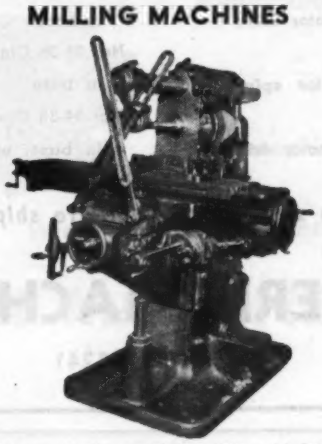
MULTIPLE DRILLS

Fox #15H 54 spindle hydraulic feed.
Fox #D-31 24 spindle motor drive.
Natco #D-5 8 spindle #1 M.T.

GRINDERS

16" Heald Rotary Surface Grinder.
#4 Brown & Sharpe Universal Grinder.
12" Heald Rotary Surface Grinder equip. with 9" Dia. Perm. Mag. chuck.
#2 Cincinnati Centerless Grinder, Filmatic.
#12 Greenfield Internal Hydromatic Grinder, sizematic type, complete with Tank and Pump.
Oliver Model 51 Drill Grinder; 1 1/2" cap.
Pratt & Whitney 14x36 model B vertical surface grinder.

MILLING MACHINES



#2 Brown & Sharpe Plain Milling Machine. Range—28 Longitudinal travel. 10" cross travel. 19" Vertical travel. Table working surface 10" x 45".
No. 5 Cincinnati, High Power, Plain, S.P.D.
No. 4 Cincinnati, High Power, Plain, S.P.D.
No. 3 Cincinnati, High Power, Vertical
No. 2 Brown & Sharpe, Vertical, S.P.D.
No. 0 Bickett Vertical Bench Miller
No. 2 Cincinnati, High Power, Plain.
No. 2 Cincinnati, Motorized, Pyramid Col.
No. 2 Brown & Sharpe, Plain (10).
No. 1 1/2 Brown & Sharpe, Plain (2)
#1 Kempsmith Universal, Cone Drive.
No. 1 1/2 Valley City Universal, Cone Dr.
No. 1 Brown & Sharpe, Plain (6).
No. 12 P & W Lincoln Type Production (2).
Ames Precision Universal Bench Mill.
P & W 2" Duplex Spline Miller.
Hall Planetary Thread Miller 24".
No. 8 Lees Bradner Thread Miller.

PLANERS

120"x72"x35' Betts, 4 Heads, M.D.
72"x72"x18' Pond Heavy Pattern, 4 Heads.
48"x48"x12' Putnam Heavy, 2 Heads, M.D.
30"x30"x12' American M.D., 2 Heads.
30"x30"x10' Cinn. Heavy Pattern, 2 Hds.
20"x20"x36" Niles-Bement-Pond, Planer Shaper, M.D.

LATHES

South Bend 16" x 6' Motorized Gap Lathe.
Putnam 26 x 12 Heavy QCG, arr. for M.D.
American, 16 x 6 Q.C.G., Geared Head
Hendey, 16 x 10 Q.C.G., Turner M.D.
Potter & Johnston #6A Automatic Chuckers; 3 1/2" dia. hole in spindle (2).
LeBlond 14 x 6 Q.C.G.
Seneca Falls Tool Room 14 x 6, Q.C.G.

SHAPERS AND GEAR CUTTERS

24" American, M.D.
16" Queen City, M.D.
7" Rhodes Horiz. High Speed, Belt Dr.
26" Cincinnati Triple Geared, Belt Dr.
#61-2 Fellows 36" Gear Shapers (2).
12" Schuchart & Schutte Gear Hobber.

BENDING ROLLS

Bertsch 3" x 3" x 3/8" angle bending roll.
Niagara pinch type 7' x 7" roll motor driven.

MISCELLANEOUS

J. C. Miller Co. Lacq. Heater with acquistat.
Heat Treating Furnaces for the tool room, all sizes.
Sleeper & Hartley #1 Wire coiling machine for making BX cable.
50 K.W. Moesta Gun Welder Transformer, portable, 25 cy. 440 volts.
Grinding Wheels for #2 centerless 4" face, 20" diameter.
Blake and Knowles 12x2x12 Simplex Type, Hydraulic Steam Pump, 2000 lbs. pressure with 80 to 125 lbs. steam, delivers 9 gallons per minute.
Niagara #98 Brake & Folder, 72" cap. 14 ga. arranged M.D.
#228C Greenlee Vertical Hollow Chisel Mortizer, Power feed, M.D.
No. 7B High Speed Riveting Hammer, cap. 3/4" to 1 1/2". New this year.

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10x48" Landis Type C Plain Hydraulic Grinder, motor drive
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LaPointe Hydraulic Broach, with 75 H.P. motor, 2 roller rests, 7 breaches, normal pull 37½ tons, max. stroke 150"
16x216" Landis Type B Plain Hydraulic Grinder, motor drive
Colonial Single Ram Broach, m.d., model VAS—5-42
No. 16—22" Bryant Hydraulic Hole Grinder, motor drive
No. 510 Oliver Drill Pointer, motor drive
No. 36-B Gould & Eberhardt Gear Cutter, for spiral and bevel gears, motor drive
10x36" Cincinnati Plain Hydraulic Grinders, motor drive.
No. 2 Cincinnati Centerless Grinder, motor drive
22x96" Monarch Type CM Geared Head Engine Lathe, m.d.
No. 1-8 Kent-Owens Hydraulic Milling Machines, m.d.
No. 4-36 Cincinnati Plain Hydromatic Milling Machine, m.d. in base
No. 34-36 Cincinnati Plain Hydromatic Milling Machine, m.d. in base
No. 34-36 Cincinnati Duplex Hydromatic Milling Machine, m.d. in base
No. 34-36 Cincinnati Duplex Hydromatic Milling Machine, m.d. in base, equipped with tracer control on each head

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AUTOMATICS, Acme, Model C—9/16" M.D.
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AUTOMATICS, Cone, 1¼ & 1½" 4 spindle
AUTOMATICS, Gridley, ⅝, 1⅛, 1⅜ & 2¼" Model F
AUTOMATICS, Gridley, 2¼, 3¼, & 4¼" S. S.
AUTOMATICS, Cleveland, 1¼, 1⅜, 2⅜ & 3⅜"
AUTOMATICS, Cleveland, ⅞, 1¼, & 2" Mod. B
AUTOMATICS, Cleveland ⅞, 1¼ & 1⅜" Mod. M
AUTOMATICS, New Britain #23 & 24 M.D.
AUTOMATICS, Potter & Johnston #5a & 6A
BORING MILLS, 24" Bullard M.D.
BORING MILLS, Rockford, 3½" bar
BORING MILLS, Horizontal, 24x72" table
DRILLS, High Sped, B. B, 1 to 6 spindles
DRILLS, Foote-Burt Heavy Duty, #5 M.T.
GEAR HOBBERS, 12 Barber-Colman, M.D.
GEAR SHAPERS, #7 High Speed, M.D.
GRINDER, Brown & Sharpe #2 Universal M.D.
GRINDERS, Cincinnati 12" x 18" Plunge Cut
GRINDERS, Diamond Surface #2, M.D.
GRINDERS, Pratt & Whitney, 14" Vertical Surface, M.D.
GRINDERS, P-Arter 12" Rotary surface, M.D.
GRINDERS, Van Norman Internal #34 M.D.
LATHES, Hendey, G.H. 13"x5' and 6', M.D.
LATHES, Monarch 14"x6' & 20" x 8' M.D.
LATHES, J. & L. 3"x36" Dble Spindle
LATHES, Warner & Swasey #2, 4, & 6, M.D.
LATHES, Warner & Swasey, #5 Geared Head, M.D.
MILLING MACHINES, Becker Vertical Model S. D. 40" Rotary Table
MILLING MACHINES, Becker Vertical #5 & 6
MILLS, Briggs Production Type A&B
PLANER, Ohio 42" x 42" x 12' One Head, M.D.
PLANER, Gray 30" x 30" x 8', 2 Rail Heads

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Large Gould & Eberhardt Rack Cutter For Sale A Rare Tool

Length of bed 13', Length of Table 6'. Direct motor driven, Cap. 2½" Pitch—5½" OD. Has 7 Rack Backings 7' Long. 4 Index Plates, 23 Feed Gears 20-120T, 8 Index Gears 20-48T. 49 Table Index Gears 21-75T, 153 Assorted High Speed Cutters. Machine guaranteed in excellent condition.

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Bending Roll, 10' x ¾" Bertsch Initial Type
Draw Block, Double, 22", M.D.
Grinder, 10' Bridgeport, Knife
Keyseater, #3 Catlin, 33"x3", M.D.
Miller, Universal, #3 Cincinnati, M.D.
Miller Vertical, #3 B. & S., S.P.D.
Miller & Shaper, #14 Cochrane-Bly, Vert., M.D.
Shaper, 20"-24"-32".
Shaper, 36" Morton, Draw Cut.

West Penn Machinery Company
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#1 CLEVELAND VERTICAL MILLING MACHINE. New 1941. Motor driven with 1½ HP AC motor and built in motor driven pump. Range—longitudinal 18" power, cross 8", vertical 16".

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ROCKFORD 24" S.P.D. Shaper
CLEVELAND 36" x 8' Openside Planer
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CIN. 30" x 26" x 16' 3-H.D.S. Planer D.H.
BARNES 4-Sp. Geared Camel Back Drill
BULLARD 24" M.D. Vert. Turret Lathes (2)
CIN. 48" Pl. Auto. Miller M.D.
NILES 12" Vert. Slotter
MILWAUKEE #3-B Vert. Miller, M.D.
BLANCHARD 26" Vert. Surf. Grinder
DIAMOND M. D. Horiz. Surf. Grinder
CLEVELAND 2¼" Bar M.D. Horiz. Boring Mill
BROWN SHARPE #2 Pl. Horiz. Miller
NILES 24" M.D. Vert. Boring Mill 2 HDS.
SMALLEY GENERAL #23-A Thread Miller
AMERICAN 24" x 12' M.D. Grd. Hd. Lathe
Write Us For Any Other Tools You May Want
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McDONALD MACHINERY CO.
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3L Gisholt Turret Lathe
48" Baush Boring Mill
Fox Multiple-Spindle Drill Model 15 H-C
2—Seneca Falls Lo-Swing Lathes 8"x24"
36"x36"x15' Betts Planer
Saunders Pipe Threader 12" to 18" Cap.
#3 Milwaukee Model H Vertical Mill

BARR MACHINERY CO.
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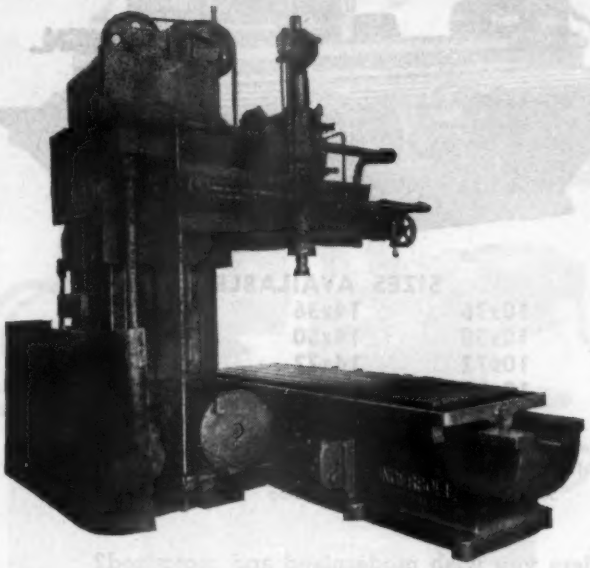
INGERSOLL OPEN SIDE VERTICAL MILLER



30" x 48" x 96" INGERSOLL OPEN SIDE VERTICAL MILLING MACHINE

Table working surface 29" x 96".
Spindle vertical feed 24".
Table travel 96".
Maximum distance spindle to column 44".
Adjustable rail.
Power rapid traverse.
Arranged for motor drive.
Weight about 24,000 lbs.

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#2A MILWAUKEE PLAIN MANUFACTURING MILLING MACHINE. Motor driven with 5 HP AC motor. Range, longitudinal 28" power, cross 10"; vertical 19".

J. L. LUCAS & SON, INC.
BRIDGEPORT 5 — CONNECTICUT

MISCELLANEOUS MACHINES

1—36"x36"x12' Cinci. Dbl. Housing Planer 2 rail hds., 1 side hd., D.C. m.d.
1—36" widened to 48"x36"x16' Gray Dbl. Housing Spur Grd. Planer with 3 hds., 3-speed A.C. m.d.
1—56"x56"x18" Cinci. Dbl. Housing Planer with 3 hds. D.C. vari. speed m.d.
1—8' Niles Pl. Radial Drill, rebuilt, gear box, A.C. m.d.
1—12"x18" Cinci. Rebuilt Plunge Cut Grinder, 18"x2" face wheel, A.C. m.d.

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#1, 2, 3 Mills Plain and Vertical
16' Bertsch Power Shear
2⅝" 4-Spindle Model G Gridley
Heavy duty double end punch and shear, equal to Ryerson #7, cuts 1" thick steel plates, A-1 condition, 30" throat depth both ends.
Elmes Hydraulic Presses, 90-350 ton.
Drill Presses sgl & mltpl spdl.

PAUL'S MOTOR AND MACHINERY SUPPLY CO.
MONA MEMBER
6111 VERMONT AVE.
DETROIT 8, MICH.

UNUSUAL VALUES

Belt Cutter 1" capacity 3 spindle
Brake, Robinson 5' toggle
Brake, Chicago steel, 3'
Compressor, 120 Schramm, portable
Drill, new 10" Buffalo bench
Drill, ceiling suspended, unlimited drilling area
1—24" Barnes motor drive
Drill, two-spindle sensitive, #1 Morse taper
Drill, Bickford 42" radial
1—22" x 72" Brown & Sharpe Universal
1—Small internal similar to Heald
Grinder, 60" knife
Hammer, 30# Bradley upright, helve
Lathe, J & L 2 x 24 turret motor drive
Pipe Machine, 8" Oster motor drive
Planer, American 30" x 30" x 8' MD.
Press, #8-7 Zah-Hahnemann straight side grd.
Press, #1 open back inclinable, motor drive
Punch & Shear two ½" capacity
Threading Machine #0 Webster & Perks
Vacuum Cleaners, heavy duty for shop use
THE OSBORNE & SEXTON MACHINERY CO.
COLUMBUS, OHIO

LATHES

36" by 26' Wickes Q.C.G., M.D.

36" by 21' LeBlond GRD Hd., M.D.

36" by 30' Putnam GRD Hd., M.D.

AARON MACHINERY CO.
45 CROSBY STREET NEW YORK, N.Y.

Two—3" NATIONAL ACME MODEL B FOUR SPINDLE AUTOMATIC SCREW MACHINES. Motor driven with 15 HP AC motors. Large quantity of equipment with each machine.

J. L. LUCAS & SON, INC.
BRIDGEPORT 5 — CONNECTICUT

GEAR MACHINERY

9" Pratt & Whitney Gear Grinder, M.D. 1937
11" Gleason Bevel Gear Generator
No. 64 Fellows Gear Shaper, M.D.
Cimatool Gear Chamfering Mach., M.D.
Lees-Bradner Gear Grinder

SHAPERS—PLANERS

26"x26"x6' Woodward-Powell Planer 2 Hds.
36"x40"x12' Cinc. Hypro. Planer, 4 hds.

MILLERS

U.S. Multi-Millers (4) 1941
No. 25-B Defiance Hor. Bor. Mill 3¼" bar, New 1941
No. 10 Brown & Sharpe—1941
No. 1—12" and 1—18" Cincinnati Plain Automatic millers latest type (8) 1941
No. 2 Cincinnati Vertical Miller, Dial Type 1941
No. 3 Cinc. Dial Type Hor. 1942
New No. 3 Wigglesworth
4" Taylor & Fenn Duplex Spline 1941

GRINDERS

No. 72-A—3—Heald Plain 1940
No. 72-A—3—Heald Sizematic 1940
10"x72" Model C Norton 1941
12"x120" Landis Pl. M.D.
No. 10 B & S Plain Grinder, M.D.

LATHES—TURRET LATHES

22"x72" Ledge & Shipley 1941
24"x72" LeBlond Lathe 1941
14" Model C Monarch Keller (1941)
14" Model C Monarch, Keller—1941
No. 1A WaWrner & Swasey (2) 1941
6"x8¾" Goss & DeLeeuw Chucking Machine
No. 6R Cincinnati Acme 1941
24" Bullard Vert. Turret, Hi-Sped 1940

MISCELLANEOUS

No. 60 1" New Britain (5)—1941
1½" Consmatic 4 spindle 1940
No. 0-Ajax Forming Roll 1941
No. 21-SA Cochrane-Bly H.S. Saw
No. 171 Bliss Stiles Sprue Cutter
New Delta Drilling Equipment
No. 4 Hvy. Duty Colburn Drill

WIGGLESWORTH MACHINERY CO.
203 Bent St., Cambridge 41, Mass.

HILL-CLARKE
Modernized
CYLINDRICAL GRINDERS *for* SUPER-GRINDING *and* MICRO-FINISH

SIZES AVAILABLE

10x36	14x36	16x30
10x50	14x50	16x50
10x72	14x72	16x72
10x120	14x96	18x96
		18x168

Hill-Clarke Modernized and Motorized Cylindrical Grinders offer refinements in design which minimize vibration and assure extreme accuracy on all grinding operations. One of these refinements, the Hill-Clarke Patented Multiple V-Belt Drive to work spindle, contributes to the smoothness in operation which makes possible a finish within a few micro-inches even when using standard grain free-cutting wheels.

Send for a copy of our catalog "Super Grinding."

Have you any NORTON grinders you wish modernized and motorized?

HILL-CLARKE MACHINERY CO.
U.S.A.

HILL-CLARKE MACHINERY CO.

651 WASHINGTON BOULEVARD — CHICAGO 6, ILL.

‡3H K & T Sliding Head Vertical Millers, M.D.
1—8' American triple purpose plain radial drill, motor on arm.
‡4 Cincinnati High Power Plain Miller, S.P.D.
‡4 Cincinnati Vertical Miller, H.P.S.D.
6' American Triple Purpose Plain Radial Drill, M.D.

HEAVY DUTY MACHINE TOOLS

52" Bullard Vertical Boring & Turning Mill.
54" Colburn Vertical Boring & Turning Mill.
60" Gisholt Vertical Boring & Turning Mill.
60" Betts Vertical Boring & Turning Mill.
5' American Triple Purpose Pl. Rad. Drill.
6' American Triple Purpose Pl. Rad. Drill.
6' Cincinnati Bickford Plain Radial Drill.
7' Cincinnati Bickford Plain Radial Drill.
‡4 Cincinnati High Power Plain Miller, PRT.
‡4 Cincinnati High Power Vert. Miller, PRT.
‡3B Milwaukee Plain Miller, S.P.D.
‡3 Brown & Sharpe Vertical Miller, S.P.D.

GRINDERS

12" x 96" Landis Plain, S.C.
16" x 72" Landis Plain Self contained.
18" x 85" Landis Plain Self contained.

GEAR MACHINERY

18" Gleason Bevel Gear Generators.
6" Bilgram Bevel Gear Generator.

PLANERS

42" x 42" x 20' Cinn. Hypro, 4 Hds. D.C. drill.
36" x 36" x 10' Gray 3 Heads. D.C. Drive complete.

CINCINNATI MACHINERY & SUPPLY CO.
217 East Second St., Cincinnati, Ohio

MILES' HIGH GRADE TOOLS

Automatic, 1¾" Gridley 4 spindle
Automatic No. 0 Brown & Sharpe
Automatic, 4½" Gridley "H" 4 spdl. chucking
Automatic, 7" Baird 6 spdl. chucking
Brake, 10' x 10 ga. Dreis & Krump leaf
Broach, No. 3, J. N. Lapointe double
Broach, No. 2L Lapointe hydraulic
Broach, No. 3 XA Oilgear hydraulic
Drill, Nos. 2 & 3 Henry Wright sens.
Drill, Nos. 11 & 12 Nateo multiple
Drill, 3½ American radial
Drill, 4' Western radial, Timken bearing
Drill, 24", No. 10 HO Baker hydraulic
Drill, 20", 21", 24" & 28" Cincinnati Bick.
Drill, 24", No. 217 Baker
Gear Hobber, No. 1 Lees Bradner
Gear Hobber, No. 16 H8 Gould Eberhardt
Gear Lapper, 8" Red Ring
Gear Generator, 15" Gleason spiral bevel
Gear Tester & Lapper, 18" Gleason bevel
Gear Chamferers, Peerless & Lipe
Gear Cutters, 36" & 48" Brown & Sharpe
Grinder, 12" x 36", 16" x 36", 16" x 52" Landis
Grinder, 16" x 48" Landis crankpin
Grinder, No. 72 Heald sizing internal
Grinder, 20" Gardner semi-auto. disc.
Grinder, 6" x 22" No. 78, W. & M. Surface
Grinder, 8" x 24" LaSalle surface
Grinder, 12" x 24" Diamond surface
Grinder, 24" Cincinnati face milling cutter
Grinder, 6" x 36", No. 10 Brown & Sharpe
Grinder, No. 13 Brown & Sharpe T. & C.
Hammer, No. 2B Nazel air, forging
Honing Machine, No. 311 Barnes
Lapper, No. 16U Norton
Lathe, Turret, No. 3B Foster
Lathe, Turret, 22" Libby
Lathe, Turret, 26" Libby, 4½" or 7¼" hole
Lathe, Turret, 36" Bullard vertical, Rap. Pro.
Lathe, 14" x 6" Hendey
Lathe, 16" x 6' Cincinnati
Mill, 3" Universal horiz. boring
Miller, No. 2 Heavy Brown & Sharpe
Miller, No. 2 Van Norman duplex
Miller, No. 2 Brown & Sharpe vert.
Miller, No. 3 Reed Prentice vertical high sped
Mills, No. 1 Davis Thompson duplex
Miller, Type C Hall Planetary thread
Miller, Size 3 Turomillers
Miller, Types 10 & 45 Productomatic
Miller, 48" Oesterlein tilted offset
Miller, No. 2 Kempsmith universal
Miller, No. 13 Brown & Sharpe, New 1942
Miller, No. 28P Van Norman, New 1942
Miller, Nos. 39H & 40H Index vertical, New 1942
Miller, No. 2 Kempsmith plain, New 1942
Planer, 24" x 24" x 5' Gray
Planer, 36" x 36" x 16' Cleveland openside
Press, 34", No. 174 Consol. gap dbl. cr.
Press, 25", No. 71 Swaine double crank
Press, No. 53 Toledo straight side
Press, No. 6 Waterbury Ferrel openback
Press, No. 33 Consolidated arch frame
Press, No. 2 Standard screw type
Riveter, Nos. 2A 5½B & 7B High Speed
Roll, No. H60 Yoder fender crowning
Roll, Forging, No. 1 Ajax Evans
Sprue Cutter, Model 1 Tessmer
Saws, 4", 7" & 8" Higley cold
Upsetter, 3" Acme steel body
Welder, 90 KVA Taylor Winfield butt
Welder, 7 KVA Winfield automatic spot

SEND FOR COMPLETE STOCK LIST

MILES MACHINERY CO., SAGINAW, MICH.

FOSDICK 3½' Radial Drill, S.P.D.
POTTER & JOHNSTON 15" Shaper.
CIN.-BICK. 30" Drill Press, P.F., T.A.
J & L 8"x36" Turret Lathe, MD.
MILWAUKEE No. 2-B Double-Over-Arm Plain Miller, MD.
Available immediately—Also many other tools
ALEX ZEEVE & COMPANY
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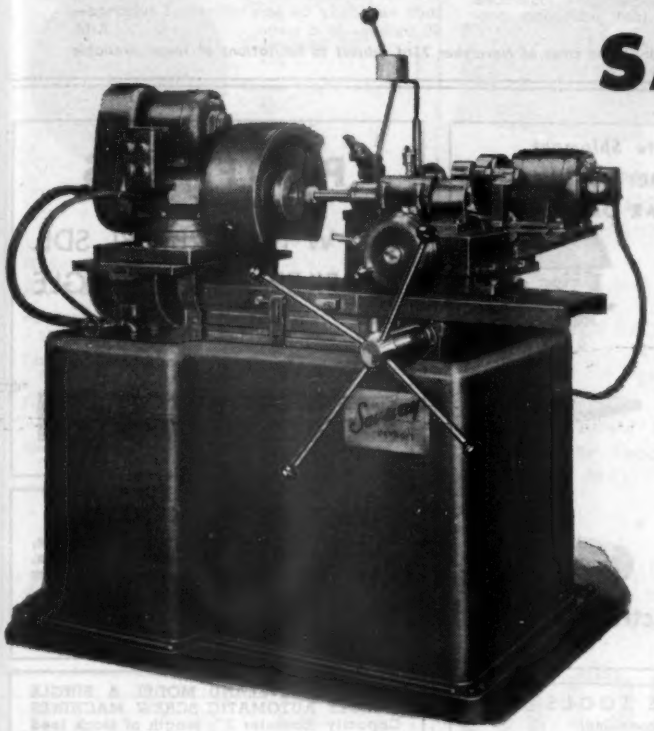
POWER PRESSES
BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
MINA
JOSEPH **HYMAN** & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

Two—‡4B BECKER VERTICAL MILLING MACHINES. Table working surface 10¼"x36". Price.....$750.00 each
J. L. LUCAS & SON, INC.
BRIDGEPORT 5 CONNECTICUT

Only 30 of these Slightly Used



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CEILING PRICE $4,970.00

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WIRE COLLECT FOR ACTUAL PHOTOS AND SPECIFICATIONS

- ★ No Priority Needed
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- ★ New Machine Guarantee
- ★ Equipped with Famous Gold Seal Spindle
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- ★ Ideal Machine for Postwar and Tool Room Work
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★ *Machine Tool Division* ★

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BUILDERS OF HAND AND HYDRAULIC INTERNAL GRINDERS • PRODUCERS OF GOLD SEAL SPINDLES • PLUG GAGES • MICROMETER CHECKERS PRECISION AIRCRAFT, AUTOMOTIVE, AND ORDNANCE PARTS

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POSITIONS WANTED (full or part-time individual salaried employment only), ½ above rates.

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BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

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The advertising rate is $6.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. A.M.

NEW ADVERTISEMENTS received by 10 A. M. November 9th will appear in the issue of November 23rd subject to limitations of space available

PREWAR PRICES

BORING MILLS

42" Colburn Vertical Boring Mill, raised 24" with two meters

44" Baush Vertical Boring Mill, raised 21½"

51" Baush Vertical Boring Mill, raised 15", 10HP motor, two heads on cross rail, tool holders

42" Bullard Vertical Boring Mill, raises 22½", 15HP motor, 20" three step cone pulley, 5HP motor

51" Bullard Boring Mill, 10HP motor, two heads on cross rail

42" Niles Bement Pond Boring Mill, raised 24"

44" Niles Bement Pond Vertical Boring Mill, 13½" rise block, 7½HP motor

53" Niles Bement Pond Vertical Boring Mill, raised 18½"

MILLERS

2 15 Garvin Planer Type Miller, vertical, with 10HP motor, pump and piping

2 15 Garvin Planer Type Miller, vertical, with 10HP motor, pump and piping

Model C Becker Vertical Miller, pump

2 5B Becker Brainard Vertical Miller, pump

THREAD MILLERS

12"x36" Lees Bradner Thread Miller, with two 3HP motors, Ingersoll Rand motor driven coolant pump and piping (New 1941)

6"x80" Pratt & Whitney Thread Miller, 2HP motor, tail stock, head stock with chuck, steady-rest, collets, pump, tank.

DRILLS

2 422 Baker Single Spindle Drill, serial 12446, 10HP GE motor, magnetic control, push button station, motor driven coolant pump and piping, set feed and change gears (New 1941)

2 422 Baker Single Spindle Drill, serial 12447, same as above

2 25 Foot-Burt Single Spindle Drill, magnetic control, push button station, table and cross travel

2 4 Baush Vertical Multi-Drill four spindles with two turret station fixtures, 25HP motor, magnetic control, push button station, coolant pump and piping

LATHE

36"x24' Bridgeford Engine Lathe, geared head, with 25 HP GE motor, 32" face plate, tool post, two follow rests

BROACH

2 4 La Pointe 60" Broach

GRINDERS

2 16-28 Bryant Grinder, three motors, magnetic control and push button stations, 21" face plate, 3 jaw chuck, ball bearing whel head, B&S coolant pump and piping (New 1941)

2 16—10" x 72" Brown & Sharpe Cylindrical Grinder, with three motors, magnetic contol, push button stations, MD work head, two centers, four work rests, built in B&S Coolant Pump and piping, center grinding attachment

2 10 Bryant Semi Automatic Hole Grinder with 5HP motor

These machines are located at Muskegon, Michigan. We have them priced right and your inquiry will prove this to you.

JOSEPH WEISNER & COMPANY

122 East 42nd St., New York 17, N.Y.

Tel: CAledonia 5-4148

For Immediate Shipment

40—Walker Turner Drill Presses

ONE YEAR OLD

Model D-1100—20 inch, No. 2 M.T., Cap. 1" in cast iron, with 1 H. P. A-C Motors, Manual starters.

Silver King counters, etc.

Used Only 6 Months

Machinery & Electric Motors Co.

815 W. Lake St. Chicago, Ill.

MACHINE TOOLS

Excellent condition!

5' American Plain Radial Drill
Thompson Universal Grinder, 12" x 30"
3⅞" Niles Bement Pond horizontal Boring Bar
ALL MOTOR DRIVEN
(Write for complete detailed specifications!)

IRON & STEEL PRODUCTS, INC.

13498 S. Brainard Ave. Chicago, Ill.

"Anything containing IRON or STEEL"

1—used Watson Stillman 600 ton single opening hydraulic press, 16" dia., by 21" stroke downward acting ram, 48" daylight opening, 31" bottom bolster, 24" x 24" platen, clear space left to right between uprights 50¼". HIGHEST PRICES PAID FOR YOUR SURPLUS EQUIPMENT.

Universal Hydraulic Machinery Company

285 HUDSON STREET, NEW YORK 13, N. Y.

Walker 5-5332-3

WANTED

WANTED ROLL FORMING machine, 8 to 10 1½" diameter double spindles, with water pump, straightening head, and automatic cut-off. Must be in good condition.

STRAITS TOOL & MACHINE CO.

10600 E. OUTER DRIVE, DETROIT 24, MICH.

WANTED 10 PUNCH PRESSES. 35 to 100 ton, OBI, geared or belt driven. Must be in good condition.

Straits Tool & Machine Company

10600 E. Outer Drive Detroit 24, Mich.

PROFILERS

P & W No. 12B DBL SDL. PROFILER & 30" SINGLE SDL.

AARON MACHINERY CO.

45 CROSBY STREET NEW YORK, N.Y.

SHEET METAL MACHINERY

NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders

MONA MEMBER

B. D. BROOKS, INC.

381 Atlantic Ave., Boston, Mass.

Five—2" CLEVELAND MODEL A SINGLE SPINDLE AUTOMATIC SCREW MACHINES Capacity diameter 2"; length of stock feed 10½". Milling Length 5½". Equipped with motor base on leg.

Price .....$750.00 each

J. L. LUCAS & SON, INC.

BRIDGEPORT 5 CONNECTICUT

2—Foster Universal geared head turret lathes, No. 1B, good condition, $1400.00 each. Warner Swasey 2A high head turret lathe, new gears in head, quiet machine, large amount of tooling & collets, $1100. 2—single spindle Gridley automatics 3¼", $1100.00 each. 18x8' & 18x8' quick change gear Engine Lathes.

GENERAL MACHINERY & EQUIPMENT CO.

180 South 15th Street HARRISBURG, PA.

If You Don't See What You Want

—ask for it!

Quoting the storekeeper's old slogan: "If you don't see what you want—ask for it." Ask the advertisers. They are constantly adding to their stocks and may have acquired just what you need. Or, shall we ask them for you? Write the

Departmental Staff

AMERICAN MACHINIST

330 W. 42nd ST., NEW YORK 18, N. Y.

USED COLLETS

FEED FINGERS PADS

ACME No. 51S, No. 52, No. 53, No. 54, No. 55, No. 56.

ACME-GRIDLEY 1⅛".

Cleveland ⅞" to 2½".

Cone 1¼", 1½", 2½".

Foster No. 1, No. 2, No. 3, No. 4, No. 5, No. 7.

Gridley, Models F, ¾", ⅞", 1⅛", 1⅜", 2¼", 2⅝", 3¼", 4¼".

Model "G" Gridley, ⅞".

No. 4 & No. 6 Warner & Swasey.

Bardons & Oliver, Brown & Sharpe, Davenport, Garvin, and New Britain.

Change Gears, Lead Cams, Form Cams, No. 53 to No. 58 Acme.

Form & Lead & Cut-off Cams for ⅞" G. Gridley.

Heads and Tailstocks for B. & S. cyl. Grinders.

Die Heads and Chasers.

Graff **MACHINE TOOL CO.**
7140 S. HALSTED ST.
All Phones Vincennes 9664
CHICAGO (21), U. S. A.

Two — 9/16" MODEL C ACME FIVE SPINDLE AUTOMATIC SCREW MACHINES New in 1930. Motor driven with 7½ HP AC motors. With forced feed lubrication.

J. L. LUCAS & SON, INC.
BRIDGEPORT 5 CONNECTICUT

Machinery for Sale

Steam hammers 1000#, 800#, 500#, Bignall-Keeler 8" pipe threader, Cochran-Bly #3 circular saw and saw sharpener; back geared #3 and #4 Morse taper drill presses, Pratt & Whitney, #3 die sinker.

WANTED

4" upsetter, 150-200 ton trimming press

Merchandise for Sale

Surplus shackles from ⅛" to 2½", boom chain 1", Liverpool and Seattle cargo hooks, 18" x 1¾" pipe turnbuckles, 18" diam, ¾" pipes 10' and 21' lengths.

Vince Forging & Manufacturing Co., Inc.
EASTON, PA.

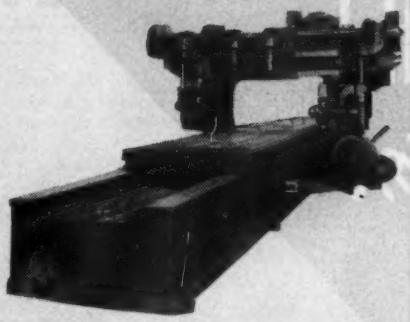
42" King Vertical Boring Mill
No. 000 Brown & Sharpe Mills, M.D.
No. 5 Cincinnati Plain Mill, S.P.D.

MDNA

D. E. DONY MACHINERY CO.
47 Laureiton Road, Rochester 9, N.Y.

OPENSIDE PLANER
48" x 48" x 19'
Detrick & Harvey, 3 Heads
LOW PRICE FOR QUICK SALE
THE O'BRIEN MACHINERY CO.
118 N. 3rd ST. PHILA. 6, PA.

HIGH GRADE TOOLS



INGERSOLL PLANER TYPE MILLING MACHINE, 42"x24"x22', motor drive. Inspection at our warehouse.

•

8' AMERICAN RADIAL DRILL, motor on arm.

•

10'-16' BORING MILL, VERTICAL. All power feeds. Power rapid traverse, M.D.

•

27"x20' NILES, BEMENT, POND LATHE, QCG, power rapid traverse to carriage, motor drive.

MOSER

MACHINE TOOL SALES
1530 W. NATIONAL AVENUE
MILWAUKEE 4, WIS.

FOR SALE

AUTOMATIC SCREW MACHINES

1—Gridley Four Spindle
1—Nat'l Acme #53 Four Spindle
3—Single Spindle

LATHES

1—3" J-L Turret Lathe
1—1¼ J-L Turret Lathe
1—Mulliner Engine Lathe

MISCELLANEOUS

1—Haskins 3C Tapping Machine
1—Delta 17" Drill Press
Small motors, tapping heads, cutting tools, drills, taps.

For full information—write—wire—phone

THE SAWTOOTH CO.
BOISE, IDAHO

#36S GOULD AND EBERHARDT GEAR CUTTER. For cutting spur gears. New in 1941. Two motor drive. Max. dia. gear with support 19", without support 36". Max. face 12".

J. L. LUCAS & SON, INC.
BRIDGEPORT 5 CONNECTICUT

CLOSEOUTS

BORING MILL
VERTICAL
66", 120" Niles
42" Bullard, M.D.
54", 62" Colburn, M.D.

HORIZONTAL
2½" Universal, Binsee
4" Binsee
3" Cleveland

TURRET LATHES
No. 2A, 3A, W. & S. 4½" hole
26" Libby, 7½" hole
18" Libby, 3½" hole
24" Gisholt, 6½" hole
Foster Nos. 4, 5, 6
Foster No. 1B, M.D.
W. & S. No. 4 Univ., Grd. Hd., M.D
J. & L. 2¼x24, 3¼x36"
Acme 3¼x36" grd head

GRINDERS
P. & W. 14", 18" B.B. Vert., M.D.
Blanchard 26", 30", M.D.
Modern 12x48", M.D.
Norton Hydr. 12x18", M.D.
Heald No. 50, 55, 60, M.D.
Norton 50"x28', M.D.
Gardner 72" Disc, M.D.
Landis 6x20" Hydraulic, M.D.
Bryant No. 12, M.D.

LATHES
14"x6' Hendey, Taper
48"x12' Harrington Gap Sid. Bed
McCabe 26-42"x14'
32"x25' New Haven, raising blocks to 60"
20"x14' Rahn-Larmon, raised to 24", M.D.
24"x10' Lodge & Shipley Grd. Hd. Taper, M.D.
16"x8' Lodge & Shipley Grd. Hd, Taper, M.D.
14"x6' Mulliner, taper
14"x6' Sebastian Grd. Hd.
9" LeBlond Automatics
Wickes 32"x26', M.D.
LeBlond 36"x21' M.D.
Putnam 36"x30', M.D.

AUTOMATICS
New Britain 1⅝", 6 Spindle
Cleveland Model A, ½", ⅝", 1¼", 2"
Cleveland Model B, 1", 2"
Gridley 4¼", sgle. spdle.
B. & S. Nos. 00, OG, 2
P. & J. No. 6A, M.D.

GEAR CUTTERS
No. 3, 12 Barber-Colman Gear Hobber
No 6 Fellows Gear Shapers
B. & S. No. 3-26", 4-36"
Gleason 11" Bevel

MILLING MACHINES
No. 20 Van Norman
10" P. & W. Automatic
No. 2A Milwaukee, S.P.D.
No. 3S Cincinnati, S.P.D Rpd. traverse, M.D.
Nos. OY, 1Y, 3, 4, 5, B. & S. Plain & Univ.
B. & S. No. 12, 13, 13B
Hall Planetary Model D
Providence Planer Type 32"x8'
Becker Nos. 3, AB, 5, 6
Nos. 3, 4, Cincinnati Vert.
P. & W. No. 12 Profiler, dbl. spindle
30" Pratt & Whitney Profiler
No. 2 Kent-Owens
No. 4, B. & S. Universal

RADIALS
5' Dreses, Full Universal
8' Amer. Triple Purpose
3', 3½' Cinc-Bickford
4' Mueller, M.D.
4', 5' Western, S.P.D.

MISCELLANEOUS
600 ton Birdsboro Hydraulic Press
6 spindle Avey Drill, 15" overhang
800 ton Coining Press, McCabe ½" Flanger
Rochester 5B Hammer
Pels 6' Throat punch
P. & W. 6" Vert. shaper
Marvel Metal Band Saw, M.D.
Pipe Machines, 4", 6", 8", M.D.
N.B.P. 15" Slotter, M.D.
150 ton United Forging Press
Thompson-Gibbs Spot Welders 17 KVA
Anderson Tapper, No. 23A Quickwork Rotary Shear
6x80" P. & W. Thread Miller
¾"x5' Plate Levelling Roll
4x4x⅝" W. & W. Angle Bending Roll

AARON MACHINERY CO.
45 Crosby St.
MDNA
New York 12, N. Y.

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Spotlighted in today's war production program are the hardened and precision ground parts made *in great volume* by Allied Products Corporation. Some of these parts, which are being made for top-flight aircraft engines, guns and other matériel of war, are finished to within limits of two ten-thousandths of an inch.

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If you are planning a postwar product, and are looking for a dependable, economical source of tools and hardened and precision ground parts, get in touch with Allied Products Corporation now.

"IT'S AN ALLIED PRODUCT" . . . Allied Products Corporation and its divisions, Richard Brothers and Victor-Peninsular, in Detroit and Hillsdale, Michigan, also make: Sheet metal dies, from the largest to the smallest; steam-heated plastic molds; jigs and fixtures, the original R-B Interchangeable Punch and Die; cap screws; cold forged parts; and other products.

ALLIED PRODUCTS
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Executive Offices: 4646 Lawton Ave., Detroit 8, Michigan

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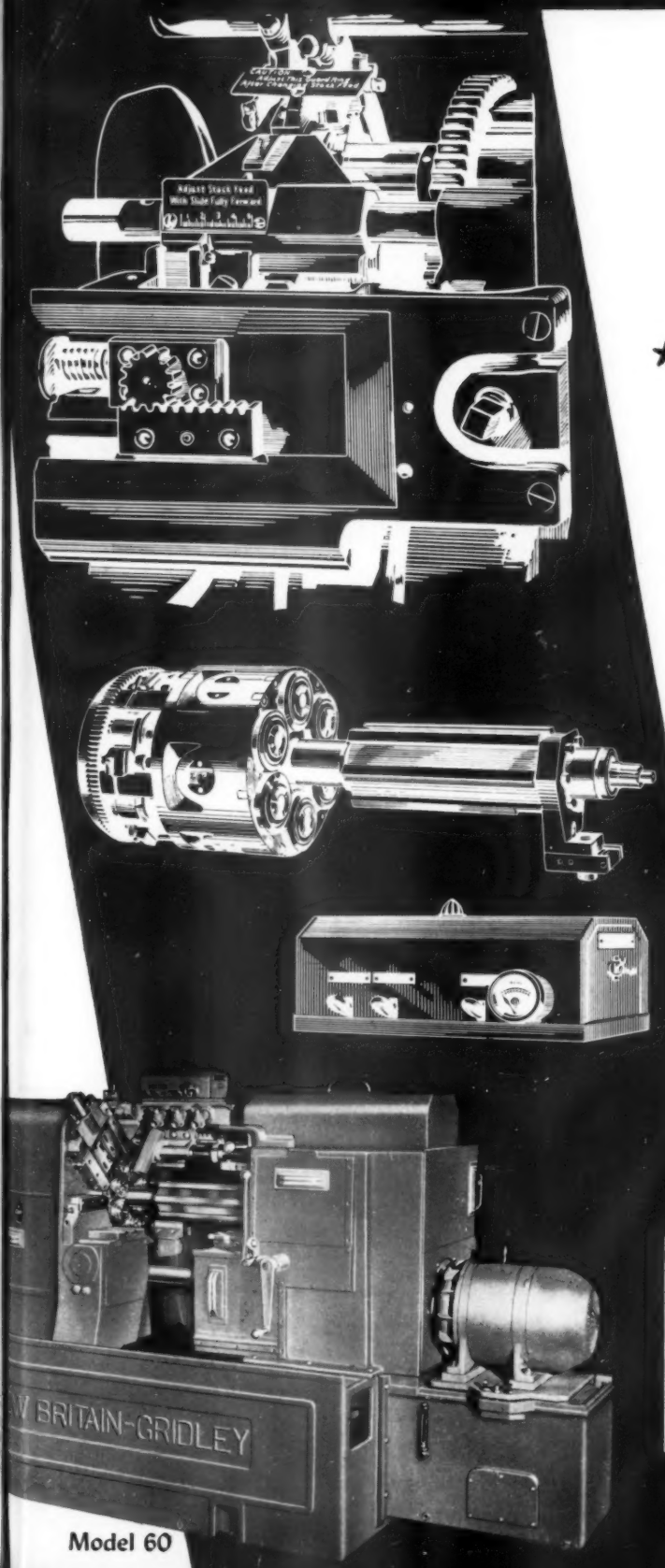

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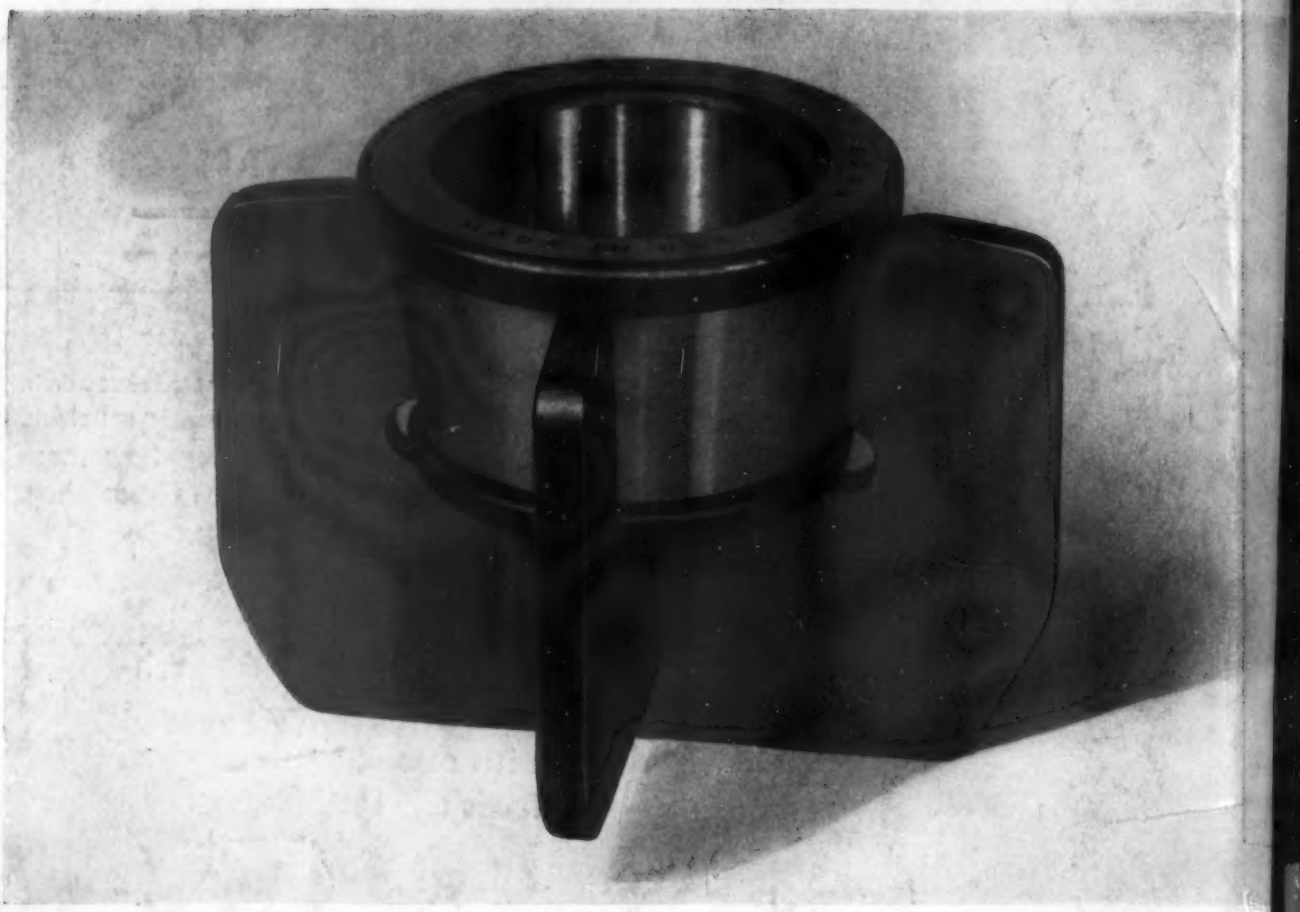

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